ANNA UNIVERSITY CHENNAI :: CHENNAI 600 025

CURRICULUM 2004

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

FIRST YEAR – ANNUAL PATTERN

(Applicable to the students admitted from the Academic year 2006-2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EC1X01	Electron Devices	3	0	0	100
EC1X02	Circuit Analysis	3	0	2	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

SEMESTER III

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
MA1201	Mathematics III	3	1	0	100
EE1211	Electrical Machines	3	0	0	100
CS1151	Data Structures	3	1	0	100
EC1201	Digital Electronics	3	1	0	100
CY1201	Environmental Science and Engineering	3	0	0	100
EC1203	Electronic Circuits- I	3	1	0	100
PRACTICAL					
EE1261	Electrical Machines Lab	0	0	3	100
EC1204	Electronic Devices and Circuits Lab I	0	0	3	100
CS1152	Data structure Lab	0	0	3	100

SEMESTER IV

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
MA1254	Random Processes	3	1	0	100
EC1251	Electronic Circuits II	3	1	0	100
EC1252	Signals and Systems	3	1	0	100
EC1253	Electromagnetic Fields	3	1	0	100
EC1254	Linear Integrated Circuits	3	0	0	100

EC1255	Measurements and Instrumentation	3	0	0	100
PRACTICAL					
EC1256	Electronics circuits II and simulation lab	0	0	3	100
EC1257	Linear Integrated Circuit Lab	0	0	3	100
EC1258	Digital Electronics lab	0	0	3	100

SEMESTER V

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
MA1251	Numerical Methods	3	1	0	100
EC1301	Communication Theory	3	1	0	100
EC1302	Digital Signal Processing	3	1	0	100
EC1303	Microprocessors and Its Applications	3	0	0	100
EC1304	Control Systems	3	1	0	100
EC1305	Transmission Lines and Waveguides	3	1	0	100
GE1302	Communication skills and Seminar**	0	0	3	-
PRACTICAL					
EC1306	Digital Signal Processing Lab	0	0	3	100
EC1307	Microprocessor and Application Lab	0	0	3	100

SEMESTER VI

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
MG1351	Principles of Management	3	0	0	100
EC1351	Digital Communication	3	1	0	100
CS1302	Computer Networks	3	0	0	100
EC1352	Antenna and Wave Propagation	3	1	0	100
CS1251	Computer Architecture	3	0	0	100
	Elective I	3	0	0	100
GE1351	Professional Skill and Seminar**	0	0	3	-
PRACTICAL					
EC1353	Communication System Lab	0	0	3	100
EC1354	Networks Lab	0	0	3	100
EC1355	Electronic System Design Lab	0	0	3	100

SEMESTER VII

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
EC1009	Digital Image Procession	3	0	0	100
EC1401	VLSI Design	3	0	0	100
EC1402	Optical Communication	3	0	0	100
EC1403	Microwave Engineering	3	0	0	100
	Elective II	3	0	0	100
	Elective III	3	0	0	100
PRACTICAL					
EC1404	VLSI Lab	0	0	3	100
EC1405	Optical & Microwave Lab	0	0	3	100

SEMESTER VIII

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
EC1451	Mobile Communication	3	0	0	100
	Elective IV	3	0	0	100
	Elective V	3	0	0	100
PRACTICAL					
EC1452	Project Work	0	0	12	200
EC1453	Comprehension**	0	0	2	-

**** No Examinations**

LIST OF ELECTIVES FOR

B.E. ELECTRONICS AND COMMUNICATION ENGG.

SEMESTER VI

Code No.	Course Title	L	T	P	M
EC1006	Medical Electronics	3	0	0	100
EC1007	Operating Systems	3	0	0	100
EC1012	Solid State Electronic Devices	3	0	0	100
EC1020	Speech Processing	3	0	0	100
EC1022	Object Oriented Programming	3	0	0	100

SEMESTER VII

Code No.	Course Title	L	T	P	M
EC1001	Advanced Microprocessor				
EC1002	Internet and Java	3	0	0	100
EC1003	Computer Hardware and Interfacing	3	0	0	100
EC1004	Advanced Digital Signal Processing	3	0	0	100
EC1005	Electomagnetics Interference and Compatibility	3	0	0	100
EC1008	High Speed Networks	3	0	0	100
EC1010	Power Electronics	3	0	0	100
EC1011	Television and Video Engineering	3	0	0	100
CS1018	Soft Computing	3	0	0	100
MG1401	Total Quality and Management	3	0	0	100

SEMESTER VIII

Code No.	Course Title	L	T	P	M
IT1353	Embedded Systems	3	0	0	100
EC1013	Wireless networks	3	0	0	100
EC1014	Telecommunication Switching and Networks	3	0	0	100
EC1015	Satellite Communication	3	0	0	100
EC1016	Advanced Electronic system design	3	0	0	100
EC1017	Optoelectronic devices	3	0	0	100
EC1018	Telecommunication System Modeling and Simulation	3	0	0	100
EC1019	Radar and Navigational Aids	3	0	0	100
EC1021	Remote Sensing	3	0	0	100
EC1023	Engineering Acoustics	3	0	0	100
GE1001	Intellectual Property Rights	3	0	0	100
GE1002	Indian Constitution and Society	3	0	0	100
GE1301	Professional Ethics and Human Values	3	0	0	100

MA1201 MATHEMATICS III 3 1 0 100

AIM

The course aims to develop the skills of the students in the areas of boundary value problems and transform techniques. 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.

OBJECTIVES

At the end of the course the students would

- Be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- Have gained a well founded knowledge of Fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.
- Have obtained capacity to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them and interpret the results.
- Have grasped the concept of expression of a function, under certain conditions, as a double integral leading to identification of transform pair, and specialization on Fourier transform pair, their properties, the possible special cases with attention to their applications.
- Have learnt the basics of Z – transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the Z – transform technique bringing out the elegance of the procedure involved.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9 + 3

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES 9 + 3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identify – Harmonic Analysis.

UNIT III BOUNDARY VALUE PROBLEMS

9 + 3

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT IV FOURIER TRANSFORM

9 + 3

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT V Z -TRANSFORM AND DIFFERENCE EQUATIONS 9 + 3

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition , Khanna Publishers, Delhi, 2001.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics Volume III", S. Chand & Company ltd., New Delhi, 1996.
3. Wylie C. Ray and Barrett Louis, C., "Advanced Engineering Mathematics", Sixth Edition, McGraw-Hill, Inc., New York, 1995.

REFERENCES

1. Andrews, L.A., and Shivamoggi B.K., "Integral Transforms for Engineers and Applied Mathematicians," Macmillen, New York, 1988.
2. Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G., "Advanced Mathematics for Engineering Students", Volumes II and III, S. Viswanathan (Printers and Publishers) Pvt. Ltd. Chennai, 2002.
3. Churchill, R.V. and Brown, J.W., "Fourier Series and Boundary Value Problems", Fourth Edition, McGraw-Hill Book Co., Singapore, 1987.

EE 1211 ELECTRICAL MACHINES 3 0 0 100

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

i. Constructional details, principle of operation, performance, starters and testing of D.C. machines.

ii. Constructional details, principle of operation and performance of transformers.

iii. Constructional details, principle of operation and performance of induction motors.

iv. Constructional details and principle of operation of alternators and special machines.

v. Power System transmission and distribution.

UNIT I D.C. MACHINES 9

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Principle of operation of D.C. motor – Back emf and torque equation – Characteristics of series, shunt and compound motors - Starting of D.C. motors – Types of starters - Testing, brake test and Swinburne's test – Speed control of D.C. shunt motors.

UNIT II TRANSFORMERS

9

Constructional details – Principle of operation – emf equation – Transformation ratio – Transformer on no load – Parameters referred to HV/LV windings – Equivalent circuit – Transformer on load – Regulation - Testing – Load test, open circuit and short circuit tests.

UNIT III INDUCTION MOTORS

9

Construction – Types – Principle of operation of three-phase induction motors – Equivalent circuit – Performance calculation – Starting and speed control – Single-phase induction motors (only qualitative treatment).

UNIT IV SYNCHRONOUS AND SPECIAL MACHINES

9

Construction of synchronous machines-types – Induced emf – Voltage regulation; emf and mmf methods – Brushless alternators – Reluctance motor – Hysteresis motor – Stepper motor.

UNIT V TRANSMISSION AND DISTRIBUTION 9

Structure of electric power systems – Generation, transmission, sub-transmission and distribution systems - EHVAC and EHVDC transmission systems – Substation layout – Insulators – cables.

L = 45 Total = 45

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, 'Basic Electrical Engineering', Tata McGraw Hill publishing company ltd, second edition, 2002.

2. C.L. Wadhwa, 'Electrical Power Systems', Wiley eastern ltd India, 1985.

REFERENCE BOOKS

1. S.K.Bhattacharya, 'Electrical Machines', Tata McGraw Hill Publishing company ltd, second edition, 1998.

2. V.K.Mehta and Rohit Mehta, 'Principles of Power System', S.Chand and Company Ltd, third edition, 2003.

CS1151 DATA STRUCTURES 3 1 0 100

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 PROBLEM SOLVING 9

Problem solving – Top-down Design – Implementation – Verification – Efficiency – Analysis – Sample algorithms.

UNIT II LISTS, STACKS AND QUEUES 8

Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT

UNIT III TREES 10

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing – Priority Queues (Heaps) – Model – Simple implementations – Binary Heap

UNIT IV SORTING 9

Preliminaries – Insertion Sort – Shellsort – Heapsort – Mergesort – Quicksort – External Sorting

UNIT V GRAPHS 9

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity – Introduction to NP-Completeness

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. R. G. Dromey, "How to Solve it by Computer" (Chaps 1-2), Prentice-Hall of India, 2002.
2. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd ed, Pearson Education Asia, 2002. (chaps 3, 4.1-4.4 (except 4.3.6), 4.6, 5.1-5.4.1, 6.1-6.3.3, 7.1-7.7 (except 7.2.2, 7.4.1, 7.5.1, 7.6.1, 7.7.5, 7.7.6), 7.11, 9.1-9.3.2, 9.5-9.5.1, 9.6-9.6.2, 9.7)

REFERENCES

1. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2004
2. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE, 1998.
3. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Pearson education Asia, 1983.

EC1201 DIGITAL ELECTRONICS 3 1 0 100

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 number systems and codes
- 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.

UNIT I NUMBER SYSTEMS 9

Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD-2421-Gray code-Excess 3 code-ASCII –Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan's Theorem-Principle of Duality- Boolean expression – Boolean function- Minimization of Boolean expressions – Sum of Products (SOP) –Product of Sums (POS)-Minterm- Maxterm- Canonical forms – Conversion between canonical forms –Karnaugh map Minimization – Don't care conditions.

UNIT II

9

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.

COMBINATIONAL CIRCUITS:
Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parity checker – code converters. Implementation of combinational logic using MUX, ROM, PAL and PLA.

UNIT III SEQUENTIAL CIRCUIT

9

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation –Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops –Asynchronous / Ripple counters – Synchronous counters –Modulo – n counter –Classification of sequential circuits – Moore and Mealy -Design of Synchronous counters: state diagram- State table –State minimization –State assignment-ASM-Excitation table and maps-Circuit implementation - Register – shift registers- Universal shift register – Shift counters – Ring counters.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS

9

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- cycles – Races –Hazards: Static –Dynamic –Essential –Hazards elimination.

UNIT V MEMORY DEVICES 9

Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM –EAPROM –Programmable Logic Devices –Programmable Logic Array (PLA)- Programmable Array Logic (PAL)-Field Programmable Gate Arrays (FPGA).

TUTORIAL 15

TOTAL : 60

1. M. Morris Mano, Digital Design, 3.ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003 – (Unit I, II, V)
2. John .M Yarbrough, Digital Logic Applications and Design, Thomson- Vikas publishing house, New Delhi, 2002. (Unit III, IV)

REFERENCES

1. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 2nd ed., Vikas Publishing House Pvt. Ltd, New Delhi, 2004
2. Charles H.Roth. "Fundamentals of Logic Design", Thomson Publication Company, 2003.
3. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 5 ed., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
4. R.P.Jain, Modern Digital Electronics, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.
5. Thomas L. Floyd, Digital Fundamentals, Pearson Education, Inc, New Delhi, 2003
6. Donald D.Givone, Digital Principles and Design, Tata Mc-Graw-Hill Publishing company limited, New Delhi, 2003.

EC1202 ELECTRON DEVICES 3 1 0 100

AIM

The aim of this course is to familiarize the student with the principle of operation, capabilities and limitation of various electron devices so that he will be able to use these devices effectively.

OBJECTIVE

On completion of this course the student will understand

- The basics of electron motion in electric field and magnetic field
- Mechanisms of current flow in semi-conductors
- Diode operation and switching characteristics
- Operation of BJT, FET, MOSFET metal semiconductor rectifying and ohmic contacts and power control devices.

UNIT I ELECTRON BALLISTICS AND INTRINSIC SEMICONDUCTORS 9

Force on charge in electric field – Motion of Charge in uniform and time varying electric fields – Force on a moving charge in a magnetic field – calculation of cyclotron frequency – calculation of electrostatic and magnetic deflection sensitivity.
Energy band structure of conductors, semiconductors and insulators – Density distribution of available energy states in semiconductors – Fermi- Diac probability distribution function at different temperatures – Thermal generation of carriers – Calculation of electron and hole densities in intrinsic semiconductors – Intrinsic concentration – Mass Action Law.

UNIT II EXTRINSIC SEMICONDUCTOR AND PN JUNCTIONS 9

N and P type semiconductors and their energy band structures – Law of electrical neutrality – Calculation of location of Fermi level and free electron and hole densities in extrinsic semiconductors – Mobility, drift current and conductivity – Diffusion current – Continuity equation - Hall effect.
Band structure of PN Junction – Current Component in a PN Junction – Derivation of diode equation – Temperature dependence of diode characteristics.

UNIT III SWITCHING CHARACTERISTICS OF PN JUNCTION AND SPECIAL DIODES 9

Calculation of transition and diffusion capacitance – Varactor diode – charge control description of diode – switching characteristics of diode – Mechanism of avalanche and Zener breakdown – Temperature dependence of breakdown voltages – Backward diode – Tunneling effect in thin barriers Tunnel diode – Photo diode – Light emitting diodes.

UNIT IV BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS 9

Construction of PNP and NPN transistors – BJT current components – Emitter to collector and base to collector current gains – Base width modulation CB and CE characteristics – Breakdown characteristics – Ebers – Moll model – Transistor switching times.
Construction and Characteristics of JFET – Relation between Pinch off Voltage and drain current – Derivation. MOSFETS – Enhancement and depletion types.

UNIT V METAL SEMICONDUCTOR CONTACTS AND POWER CONTROL DEVICES 9

Metal Semiconductor Contacts - Energy band diagram of metal semiconductor junction Schottky diode and ohmic contacts.
Power control devices: Characteristics and equivalent circuit of UJT - intrinsic stand off ratio. PNPN diode – Two transistor model, SCR, Triac, Diac.

TUTORIAL 15

TOTAL : 60

TEXT BOOK

1. Jacob Millman & Christos C.Halkias, “Electronic Devices and Circuits” Tata McGraw–Hill, 1991 .

REFERENCES

1. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices – Modelling and Technology, Prentice Hall of India, 2004.
2. Donald A.Neaman,” Semiconductor Physics and Devices” 3rd Ed., Tata McGraw-Hill 2002.
3. S.Salivahanan, N.Sureshkumar and A.Vallavaraj, Electronic Devices and Circuits, TMH, 1998.
4. S.M.Sze, Semiconductor Devices – Physics and Technology, 2nd edn. John Wiley, 2002.
5. Ben G.Streetman and Sanjay Banerjee, Solid State Electronic Devices, Pearson Education 2000.

EC1203 ELECTRONIC CIRCUITS I 3 1 0 100

AIM

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

OBJECTIVE

On completion of this course the student will understand

- The methods of biasing transistors
- Design of simple amplifier circuits
- Mid – band 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 and heat sinks

- Analysis and design of power supplies and power control using SCR.

UNIT I TRANSISTOR BIASING 9

BJT – Need for biasing - Fixed bias circuit, Load line and quiescent point. Variation of quiescent point due to $\mathbf{h_{FE}}$ variation within manufacturers tolerance. Stability factors. Different types of biasing circuits. Method of stabilizing the Q point to the extent possible. Advantage of Self bias (voltage divider bias) over other types of biasing. Use of Self bias circuit as a constant current circuit. Source self bias and voltage divider bias for FET. Use of JFET as a voltage variable resistor.

UNIT II MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 9

CE, CB and CC amplifiers. Method of drawing small-signal equivalent circuit. Midband analysis of various types of single stage amplifiers to obtain gain, input impedance and output impedance. Miller's theorem. Comparison of CB, CE and CC amplifiers and their uses. Darlington connection using similar and Complementary transistors. Methods of increasing input impedance using Darlington connection and bootstrapping. CS, CG and CD (FET) amplifiers. Multistage amplifiers.
Basic emitter coupled differential amplifier circuit. Bisection theorem. Differential gain. CMRR. Use of constant current circuit to improve CMRR. Derivation of transfer characteristic, Transconductance. Use as Linear amplifier, limiter, amplitude modulator.

UNIT III FREQUENCY RESPONSE OF AMPLIFIERS 9

General shape of frequency response of amplifiers. Definition of cut off frequencies and bandwidth. Low frequency analysis of amplifiers to obtain lower cut off frequency Hybrid – pi equivalent circuit of BJTs. High frequency analysis of BJT amplifiers to obtain upper cut off frequency. 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 cut off frequencies of multistage amplifiers. Amplifier rise time and sag and their relation to cut off frequencies.

UNIT IV LARGE SIGNAL AMPLIFIERS 9

Classification of amplifiers (Class A, B, AB, C&D), Efficiency of class A, RC coupled and transformer-coupled power amplifiers. Class B complementary-symmetry, push-pull power amplifiers. Calculation of power output, efficiency and power dissipation. Crossover distortion and methods of eliminating it.
Heat flow calculations using analogous circuit. Calculation of actual power handling capacity of transistors with and without heat sink. Heat sink design.

UNIT V RECTIFIERS AND POWER SUPPLIES 9

Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for Vdc and ripple voltage with C, CL, L-C and C-L-C filters. Voltage multipliers Zenerdiode regulator. Electronically regulated d.c power supplies. Line regulation, output resistance and temperature coefficient. Switched mode power supplies. Power control using SCR.

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. Millman J. and Halkias .C., " Integrated Electronics ", Tata McGraw-Hill.

REFERENCES

1. Robert L. Boylestad and Louis Nashelsky, 8th edn., PHI, 2002.
2. S.Salivahanan, et.al, "Electronic Devices and Circuits", TMH, 1998.
3. Floyd, Electronic Devices, Sixth edition, Pearson Education, 2003.
4. I.J. Nagrath, Electronics – Analog and Digital, PHI, 1999.

EE 1261 ELECTRICAL MACHINES LABORATORY 0 0 3 100

AIM

To expose the students to the basic operation of electrical machines and help them to develop experimental skills.

1. Open circuit and load characteristics of separately excited and self excited D.C. generator.
2. Load test on D.C. shunt motor.
3. Load test on D.C. series motor.
4. Swinburne's test and speed control of D.C. shunt motor.
5. Load test on single phase transformer and open circuit and short circuit test on single phase transformer
6. Regulation of three phase alternator by EMF and MMF methods.
7. Load test on three phase induction motor.
8. No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)
9. Load test on single-phase induction motor.
10. Study of D.C. motor and induction motor starters.

P = 45 Total = 45

EC1204 ELECTRONIC DEVICES AND CIRCUITS LAB -I 0 0 3 100

Ex.1: Diode Forward characteristics.

(i) Determination of η from the plot of ln I vs V.

(ii) Determinations reverse saturation current.

[Note that reverse characteristics of Diodes cannot be measured using common instruments available in the Lab.]

Ex.2: Input and Output characteristics of BJT.

1. Determination of h parameters from the graph.

Ex.3: Output characteristics of JFET.

(i) Plot of Transfer characteristics from the output characteristics.

(ii) Determination of pinch off voltage and Idss

Ex.4: Fixed Bias amplifier circuits using BJT.

(i) Waveforms at input and output without bias.

(ii) Determination of bias resistance to locate Q-point at center of load line.

(iii) Measurement of hFE and gain.

(iv) Calculation of hie=VT/Ibdc and gain assuming hFE= hfe.

(v) Plot of frequency response.

Ex.5: BJT Amplifier using voltage divider bias (self bias) with unbypassed emitter resistor.

(i) Measurement of input resistance and gain

(ii) Comparison with calculated values.

(iii) Plot of DC collector current as a function of collector resistance (application as constant current circuit).

Ex.6: Source follower with Bootstrapped gate resistance.

(i) Measurement of gain, input resistance and output resistance with and without Bootstrapping .

(ii) Comparison with calculated values.

Ex.7: Class B Complementary symmetry power amplifier

1. Observation of the output wave form with cross over Distortion.
2. Modification of the circuit to avoid cross over distortion.
3. Measurement of maximum power output.
4. Determination of efficiency.
5. Comparison with calculated values.

Ex.8: Differential amplifier using BJT.

1. Construction of the circuit.
2. Measurement of DC collector current of individual transistors.
3. Equalization of DC current using individual emitter resistance (50 – 100 Ohms)
4. Measurement of CMRR.

Ex.9: Power supply Full wave rectifier with simple capacitor filter.

(i) Measurement of DC voltage under load and ripple factor, Comparison with calculated values.

(ii) Measurement of load regulation characteristics (Vout vs Iout). Comparison with calculated values.

Ex.10: Measurement of UJT and SCR Characteristics.

1. Firing Characteristics of SCR.
2. Measurement of Intrinsic stand off ratio of UJT.

CS1152 DATA STRUCTURES LAB 0 0 3 100

AIM

To teach the principles of good programming practice and to give a practical training in writing efficient programs in C

OBJECTIVES

- To teach the students to write programs in C
- To implement the various data structures as Abstract Data Types
- To write programs to solve problems using the ADTs

Implement the following exercises using C:

1. Array implementation of List Abstract Data Type (ADT)
2. Linked list implementation of List ADT
3. Cursor implementation of List ADT
4. Array implementations of Stack ADT
5. Linked list implementations of Stack ADT

The following three exercises are to be done by implementing the following source files

(a) Program for 'Balanced Paranthesis'
(b) Array implementation of Stack ADT
(c) Linked list implementation of Stack ADT
(d) Program for 'Evaluating Postfix Expressions'

An appropriate header file for the Stack ADT should be #included in (a) and (d)

6. Implement the application for checking 'Balanced Paranthesis' using array implementation of Stack ADT (by implementing files (a) and (b) given above)
7. Implement the application for checking 'Balanced Paranthesis' using linked list implementation of Stack ADT (by using file (a) from experiment 6 and implementing file (c))

8. Implement the application for 'Evaluating Postfix Expressions' using array and linked list implementations of Stack ADT (by implementing file (d) and using file (b), and then by using files (d) and (c))
9. Queue ADT
10. Search Tree ADT - Binary Search Tree
11. Heap Sort
12. Quick Sort

MA1254 RANDOM PROCESSES 3 1 0 100

AIM

This course aims at providing the necessary basic concepts in random processes. A knowledge of fundamentals and applications of phenomena will greatly help in the understanding of topics such a estimation and detection, pattern recognition, voice and image processing networking and queuing.

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 PROBABILITY AND RANDOM VARIABLE 9 +3

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

UNIT II STANDARD DISTRIBUTIONS 9 +3

Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9 + 3

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.

UNIT IV CLASSIFICATION OF RANDOM PROCESSES 9 + 3

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V 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 - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. Ross, S., "A First Course in Probability", Fifth edition, Pearson Education, Delhi, 2002.
2. Peebles Jr. P.Z., "Probability Random Variables and Random Signal Principles", Tata McGraw-Hill Pubishers, Fourth Edition, New Delhi, 2002. (Chapters 6, 7 and 8).

REFERENCES

1. Henry Stark and John W. Woods "Probability and Random Processes with Applications to Signal Processing", Pearson Education, Third edition, Delhi, 2002.
2. Veerarajan. T., "Probabilitiy, Statistics and Random process", Tata McGraw-Hill Publications, Second Edition, New Delhi, 2002.
3. Ochi, M.K. , "Applied Probability and Stochastic Process", John Wiley & Sons, New York, 1990.

EC1251 ELECTRONIC CIRCUITS II 3 1 0 100

AIM

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

OBJECTIVES

On completion of this course the student will understand

- The advantages and method of analysis of feed back amplifiers
- Analysis and design of RC and LC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time based generators.

UNIT 1 FEEDBACK AMPLIFIERS 9

Block diagram. Loop gain. Gain with feedback. Desensitivity of gain. Distortion and cut off frequencies with feedback. The four basic feedback topologies and the type of gain stabilized by each type of feedback. Input and Output resistances with feedback. Method of identifying feedback topology, feedback factor and basic amplifier configuration with loading effect of feedback network taken into account. Analysis of feedback amplifiers. Nyquist criterion for stability of feedback amplifiers.

UNIT II OSCILLATORS 9

Barkhausen Criterion. Mechanism for start of oscillation and stabilization of amplitude. Analysis of Oscillator using Cascade connection of one RC and one CR filters. RC phase shift Oscillator. Wienbridge Oscillator and twin-T Oscillators. Analysis of LC Oscillators, Colpitts, Hartley, Clapp, Miller and Pierce oscillators. Frequency range of RC and LC Oscillators. Quartz Crystal Construction. Electrical equivalent circuit of Crystal. Crystal Oscillator circuits.

UNIT III TUNED AMPLIFIERS 9

Coil losses, unloaded and loaded Q of tank circuits. Analysis of single tuned and synchronously tuned amplifiers. Instability of tuned amplifiers. Stabilization techniques. Narrow band neutralization using coil. Broad banding using Hazeltine neutralization. Class C tuned amplifiers and their applications. Efficiency of Class C tuned Amplifier.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

RL & RC Integrator and Differentiator circuits. Diode clippers, clampers and slicers. Collector coupled and Emitter coupled Astable multivibrator. Monostable multivibrator. Bistable multivibrators. Triggering methods. Storage delay and calculation of switching times. Speed up capacitors. Schmitt trigger circuit.

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS 9

Monostable and Astable Blocking Oscillators using Emitter and base timing. Frequency control using core saturation. Pushpull operation of Astable blocking oscillator i.e., inverters. Pulse transformers. UJT sawtooth generators. Linearization using constant current circuit. Bootstrap and Miller saw-tooth generators. Current time base generators.

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. Millman and Halkias. C., “Integrated Electronics”, Tata McGraw-Hill 1991,(I,II).
2. Schilling and Belove, "Electronic Circuits", TMH, Third Edition, 2002 (Unit - III)
3. Millman J. and Taub H., "Pulse Digital and Switching waveform", McGraw-Hill International (UNIT – IV & V)
4. Robert L. Boylestead and Louis Nasheresky, 8th edn., PHI, 2002.

REFERENCES

1. Sedra / Smith, “Micro Electronic Circuits” Oxford university Press, 2004.
2. David A. Bell, " Solid State Pulse Circuits ", Prentice Hall of India, 1992.

EC1252 SIGNALS AND SYSTEMS 3 1 0 100

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 REPRESENTATION OF SIGNALS 9

Continuous and discrete time signals: Classification of Signals – Periodic aperiodic even – odd – energy and power signals – Deterministic and random signals – complex exponential and sinusoidal signals – periodicity – properties of discrete time complex exponential unit impulse – unit step impulse functions – Transformation in independent variable of signals: time scaling, time shifting.
Determination of Fourier series representation of continuous time and discrete time periodic signals – Explanation of properties of continuous time and discrete time Fourier series.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS 9

Continuous time Fourier Transform and Laplace Transform analysis with examples – properties of the Continuous time Fourier Transform and Laplace Transform basic properties, Parseval’s relation, and convolution in time and frequency domains.
Basic properties of continuous time systems: Linearity, Causality, time invariance, stability, magnitude and Phase representations of frequency response of LTI systems -Analysis and characterization of LTI systems using Laplace transform:
Computation of impulse response and transfer function using Laplace transform.

UNIT III SAMPLING THEOREM AND z-TRANSFORMS 9

Representation of continuous time signals by its sample - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals

Basic principles of z-transform - z-transform definition – region of convergence – properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion, Relationship between z-transform and Fourier transform.

UNIT IV DISCRETE TIME SYSTEMS 9

Computation of Impulse & response & Transfer function using Z Transform. DTFT Properties and examples – LTI-DT systems -Characterization using difference equation – Block diagram representation – Properties of convolution and the interconnection of LTI Systems – Causality and stability of LTI Systems.

UNIT V SYSTEMS WITH FINITE AND INFINITE DURATION IMPULSE RESPONSE 9

Systems with finite duration and infinite duration impulse response – recursive and non-recursive discrete time system – realization structures – direct form – I, direct form – II, Transpose, cascade and parallel forms.

TUTORIAL 15

TOTAL : 60

TEXT BOOK

1. AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, Signals & Systems, 2nd edn., Pearson Education, 1997.

REFERENCES

1. John G.Proakis and Dimitris G.Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, 3rd edn., PHI, 2000.
2. M.J.Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH 2003.
3. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999
4. K.Lindner, “Signals and Systems”, McGraw Hill International, 1999.
5. Moman .H. Hays,” Digital Signal Processing “, Schaum’s outlines, Tata McGraw-Hill Co Ltd., 2004.
6. Ashok Amhardar, “Analog and Digital Signal Processing”, 2 nd Edition Thomson 2002.

EC1253 ELECTROMAGNETIC FIELDS 3 1 0 100

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 Strokes 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 Density – Gauss Law – Proof of Gauss Law – Applications.

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 carrying a current I – Magnetic moment – Magnetic Vector Potential.

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 9

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.

Linear, Elliptical and circular polarization – Reflection of Plane Wave from a conductor – normal incidence – Reflection of Plane Waves by a perfect dielectric – normal and oblique incidence. Dependence on Polarization. Brewster angle.

TUTORIAL 15

TOTAL : 60

TEXTBOOKS

1. William H.Hayt : "Engineering Electromagnetics" TATA 2003 (Unit I,II,III).
2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Prentice Hall of India 2nd edition 2003. (Unit IV, V). McGraw-Hill, 9th reprint

REFERENCES

1. Ramo, Whinnery and Van Duzer: "Fields and Waves in Communications Electronics" John Wiley & Sons (3rd edition 2003)
2. .Narayana Rao, N : "Elements of Engineering Electromagnetics" 4th edition, Prentice Hall of India, New Delhi, 1998.
3. M.N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, Third edition.
4. David K.Cherp: "Field and Wave Electromagnetics - Second Edition-Pearson Edition.
5. David J.Grithiths: "Introduction to Electrodynamics- III Edition-PHI.

EC1254 LINEAR INTEGRATED CIRCUITS 3 0 0 100

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 a few special function integrated circuits.

UNIT I CIRCUIT CONFIGURATION FOR LINEAR ICs 9

Current sources, Analysis of difference amplifiers with active loads, supply and temperature independent biasing, Band gap references, Monolithic IC operational amplifiers, specifications, frequency compensation, slew rate and methods of improving slew rate.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and Non inverting Amplifiers, Differentiator, Integrator, Voltage to current converter, Instrumentation amplifier, Sine wave Oscillator, Low-pass and band-pass filters, Comparator, Multivibrators and Schmitt trigger, Triangular wave generator, Precision rectifier, Log and Antilog amplifiers, Non-linear function generator.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analysis of four quadrant (Gilbert cell) and variable transconductance multipliers, Voltage controlled Oscillator, Closed loop analysis of PLL, AM, PM and FSK modulators and demodulators, Frequency synthesizers, Compander ICs.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS 9

Analog switches, High speed sample and hold circuits and sample and hold ICs, Types of D/A converter, Current driven DAC, Switches for DAC, A/D converter-Flash, Single slope, Dual slope, Successive approximation, Delta Sigma Modulation, Voltage to Time converters.

UNIT V SPECIAL FUNCTION ICS 9

Astable and Monostable Multivibrators using 555 Timer, Voltage regulators-linear and switched mode types, Switched capacitor filter, Frequency to Voltage converters, Tuned amplifiers, Power amplifiers and Isolation Amplifiers, Video amplifiers, Fiber optic ICs and Opto-couplers.

TOTAL : 45

TEXT BOOK

1. Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill, 1997.
2. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.

REFERENCES

1. Gray and Meyer, 'Analysis and Design of Analog Integrated Circuits', Wiley International, 1995.
2. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India, 1996.
3. Ramakant A.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 1994.
4. K.R.Botkar, 'Integrated Circuits'. Khanna Publishers, 1996.
5. Taub and Schilling, Digital Integrated Electronics, McGraw-Hill, 1997.
6. Millman.J. and Halkias.C.C. 'Integrated Electronics', McGraw-Hill, 1972.
7. William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits'. Pearson Education, 2004.

EC1255 MEASUREMENTS AND INSTRUMENTATION 3 0 0 100

AIM

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

OBJECTIVE

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 9

Measurement systems – Static and dynamic characteristics – units and standards of measurements – error analysis – moving coil, moving iron meters – multimeters – True RMS meters – Bridge measurements – Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT II BASIC ELECTRONIC MEASUREMENTS 9

Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes – Q meters – Vector meters – RF voltage and power measurements.

UNIT III SIGNAL GENERATORS AND ANALYZERS 9

Function generators – RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer.

UNIT IV DIGITAL INSTRUMENTS 9

Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – measurement errors.

UNIT V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS 9

Elements of a digital data acquisition system – interfacing of transducers – multiplexing – computer controlled instrumentation – IEEE 488 bus – fiber optic measurements for power and system loss – optical time domains reflectometer.

TOTAL : 45

TEXT BOOK

1. Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India, 2003.

REFERENCES

1. Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, Pearson education, 2003.
2. Alan. S. Morris, Principles of Measurements and Instrumentation, Prentice Hall of India, 2nd edn., 2003.
3. Ernest O. Doebelin, Measurement Systems- Application and Design-Tata McGraw-Hill-2004.

EC1256 ELECTRONICS CIRCUITS II AND SIMULATION LAB 0 0 3 100

1. Series and Shunt feedback amplifiers:
   Frequency response, Input and output impedance calculation
2. Design of RC Phase shift oscillator: Design Wein Bridge Oscillator
3. Design of Hartley and Colpitts Oscilator
4. Tuned Class C
5. Integrators, Differentiators, Clippers and Clampers
6. Design of Astable and Monostable and Bistable multivibrators

SIMULATION USING PSPICE:

1. Differentiate amplifier
2. Active filter : Butterworth IInd order LPF
3. Astable, Monostable and Bistable multivibrator - Transistor bias
4. D/A and A/D converter (Successive approximation)
5. Analog multiplier
6. CMOS Inventor, NAND and NOR

EC1257 LINEAR INTEGRATED CIRCUITS LAB 0 0 3 100

Design and testing of:

1. Inverting, Non inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier.
4. Active lowpass and bandpass filter.
5. Astable, Monostable multivibrators and Schmitt Trigger using op-amp.
6. Phase shift and Wien bridge oscillator using op-amp.
7. Astable and monostable using NE555 Timer.
8. PLL characteristics and Frequency Multiplier using PLL.
9. DC power supply using LM317 and LM723.
10. Study of SMPS control IC SG3524 / SG3525.

EC1258 DIGITAL ELECTRONICS LAB 0 0 3 100

1. Design and implementation of Adders and Subtractors using logic gates.
2. Design and implementation of code converters using logic gates
   (i) BCD to excess-3 code and voice 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 of2Bit 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- flopss

GE1301 PROFESSIONAL ETHICS AND HUMAN VALUES 3 0 0 100

OBJECTIVE

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

1. HUMAN VALUES 10

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality

2. ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

3. ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

4. SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies.
Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

5. GLOBAL ISSUES 8

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers(India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE),India, etc.

TOTAL : 45

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York, 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint)
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

EC1301 COMMUNICATION THEORY 3 1 0 100

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.

OBJECTIVE

- 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 MODULATIONS 9

Generation and demodulation of AM, DSB-SC, SSB-SC, VSB Signals, Filtering of sidebands, Comparison of Amplitude modulation systems, Frequency translation, Frequency Division multiplexing, AM transmitters – Superhetrodyne receiver, AM receiver.

UNIT II ANGLE MODULATION 9

Angle modulation, frequency modulation, Narrowband and wideband FM, transmission bandwidth of FM signals, Generation of FM signal – Direct FM – indirect FM, Demodulation of FM signals, FM stereo multiplexing, PLL – Nonlinear model and linear model of PLL, Non-linear effects in FM systems, FM Broadcast receivers, FM stereo receives.

UNIT III NOISE PERFORMANCE OF DSB, SSB RECEIVERS 9

Noise – Shot noise, thermal noise, White noise, Noise equivalent Bandwidth, Narrowband noise, Representation of Narrowband noise in terms of envelope and phase components, Sinewave plus Narrowband Noise, Receiver model, Noise in DSB-SC receiver, Noise in SSB receiver

UNIT IV NOISE PERFORMANCE OF AM AND FM RECEIVERS 9

Noise in AM receivers threshold effect, Noise in FM receivers capture effect, FM threshold effect, FM threshold reduction, Pre-emphasis and de-emphasis in FM, Comparison of performance of AM and FM systems.

UNIT V INFORMATION THEORY 9

Uncertainty, Information and entropy, Source coding theorem, Data compaction, Discrete memory less channels, mutual information, channel capacity, channel coding theorem, Differential entropy, and mutual information for continuous ensembles, information capacity theorem, implication of the information capacity theorem, rate distortion theory, Compression of information.

TUTORIAL 15

TOTAL : 60

TEXT BOOK

1. Simon Haykin, Communication Systems, John Wiley & sons, NY, 4th Edition, 2001.

REFERENCES

1. Roddy and Coolen, Electronic communication, PHI, New Delhi, 4th Edition, 2003.
2. Taub and Schilling, Principles of communication systems, TMH, New Delhi, 1995.
3. Bruce Carlson et al, Communication systems, McGraw-Hill Int., 4th Edition, 2002.

EC1302 DIGITAL SIGNAL PROCESSING 3 1 0 100

AIM

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 FFT 9

Introduction to DFT – Efficient computation of DFT Properties of DFT – FFT algorithms – Radix-2 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms –Use of FFT algorithms in Linear Filtering and correlation.

UNIT II DIGITAL FILTERS DESIGN 9

Amplitude and phase responses of FIR filters – Linear phase filters – Windowing techniques for design of Linear phase FIR filters – Rectangular, Hamming, Kaiser windows – frequency sampling techniques – IIR Filters – Magnitude response – Phase response – group delay - Design of Low Pass Butterworth filters (low pass) - Bilinear transformation – prewarping, impulse invariant transformation.

UNIT III FINITE WORD LENGTH EFFECTS 9

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representation – comparison – over flow error – truncation error – co-efficient quantization error - limit cycle oscillation – signal scaling – analytical model of sample and hold operations.

UNIT IV POWER SPECTRUM ESTIMATION 9

Computation of Energy density spectrum – auto correlation and power spectrum of random signals. Periodogram – use of DFT in power spectrum estimation – Non parametric methods for power spectral estimation: Bartlett and Welch methods – Blackman and Tukey method.

UNIT V DIGITAL SIGNAL PROCESSORS 9

Introduction to DSP architecture – Harvard architecture - Dedicated MAC unit - Multiple ALUs, Advanced addressing modes, Pipelining, Overview of instruction set of TMS320C5X and C54X.

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. John G Proakis, Dimtris G Manolakis, Digital Signal Processing Principles, Algorithms and Application, PHI, 3rd Edition, 2000,
2. B.Venkataramani & M. Bhaskar, Digital Signal Processor Architecture, Programming and Application, TMH 2002. (UNIT – V)

REFERENCES

1. Alan V Oppenheim, Ronald W Schafer, John R Back, Discrete Time Signal Processing, PHI, 2nd Edition 2000,
2. Avtar singh, S.Srinivasan DSP Implementation using DSP microprocessor with Examples from TMS32C54XX -Thamson / Brooks cole Publishers, 2003
3. S.Salivahanan, A.Vallavaraj, Gnanapriya, Digital Signal Processing, McGraw-Hill / TMH, 2000
4. Johny R.Johnson :Introduction to Digital Signal Processing, Prentice Hall, 1984.

5. S.K.Mitra, “Digital Signal Processing- A Computer based approach”, Tata McGraw-Hill, 1998, New Delhi.

EC1303 MICROPROCESSORS AND ITS APPLICATIONS 3 0 0 100

AIM

To learn the architecture programming and interfacing of microprocessors and microcontrollers.

OBJECTIVES

- To introduce the architecture and programming of 8085 microprocessor.
- To introduce the interfacing of peripheral devices with 8085 microprocessor.
- To introduce the architecture and programming of 8086 microprocessor.
- To introduce the architecture, programming and interfacing of 8051 micro controller.

UNIT I 8085 CPU 9

8085 Architecture – Instruction set – Addressing modes – Timing diagrams – Assembly language programming – Counters – Time Delays – Interrupts – Memory interfacing – Interfacing, I/O devices.

UNIT II PERIPHERALS INTERFACING 9

Interfacing Serial I/O (8251)- parallel I/O (8255) –Keyboard and Display controller (8279) – ADC/DAC interfacing – Inter Integrated Circuits interfacing (I^2C Standard)-
Bus: RS232C-RS485-GPIB

UNIT III 8086 CPU 9

Intel 8086 Internal Architecture – 8086 Addressing modes- Instruction set- 8086 Assembly language Programming–Interrupts.

UNIT IV 8051 MICROCONTROLLER 9

8051 Micro controller hardware- I/O pins, ports and circuits- External memory –Counters and Timers- Serial Data I/O- Interrupts-Interfacing to external memory and 8255.

UNIT V 8051 PROGRAMMING AND APPLICATIONS 9

8051 instruction set – Addressing modes – Assembly language programming – I/O port programming - Timer and counter programming – Serial Communication – Interrupt programming –8051 Interfacing: LCD, ADC, Sensors, Stepper Motors, Keyboard and DAC.

TOTAL : 45

TEXT BOOKS

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 4th Edition, Penram International Publishing, New Delhi, 2000. (Unit I, II)
2. John Uffenbeck, The 80x86 Family, Design, Programming and Interfacing, Third Edition. Pearson Education, 2002.

3. Mohammed Ali Mazidi and Janice Gillispie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, New Delhi, 2003. (Unit IV, V)

REFERENCES

1. A.K. Ray and K.M.Burchandi, Intel Microprocessors Architecture Programming and Interfacing, McGraw Hill International Edition, 2000
2. Kenneth J Ayala, The 8051 Microcontroller Architecture Programming and Application, 2nd Edition, Penram International Publishers (India), New Delhi, 1996.
3. M. Rafi Quazzaman, Microprocessors Theory and Applications: Intel and Motorola prentice Hall of India, Pvt. Ltd., New Delhi, 2003.

EC1304 CONTROL SYSTEMS 3 1 0 100

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 MODELLING 9

System concept, differential equations and transfer functions. Modelling of electric systems, translational and rotational mechanical systems, Simple electromechanical systems.
Block diagram representation of systems – Block diagram reduction methods – Closed loop transfer function, determination of signal flow graph. Mason's gain formula – Examples.

UNIT II TIME DOMAIN ANALYSIS 9

Test signals – time response of first order and second order systems – time domain specifications – types and order of systems – generalised error co-efficients – steady state errors – concepts of stability – Routh-Hurwitz stability – root locus.

UNIT III FREQUENCY DOMAIN ANALYSIS 9

Introduction – correlation between time and frequency response – stability analysis using Bode plots, Polar plots, Nichols chart and Nyquist stability criterion – Gain margin – phase margin.

UNIT IV COMPENSATORS 9

Realization of basic compensators – cascade compensation in time domain and frequency domain and feedback compensation – design of lag, lead, lag-lead compensator using Bode plot and Root locus. Introduction to P, PI and PID controllers.

UNIT V CONTROL SYSTEM COMPONENTS AND APPLICATION OF CONTROL SYSTEMS 9

Stepper motors – AC servo motor – DC servo motor – Synchros – sensors and encoders – DC tacho generator – AC tacho generator – Hydraulic controller – Pneumatic controller – Typical application of control system in industry.

TUTORIAL **15**

TOTAL : 60

TEXT BOOKS

1. Ogata.K, Modern Control Engineering, Prentice Hall of India, 4th Edition, 2003 (UNIT I – IV)
2. Nagrath & Gopal, Control System Engineering, 3rd Edition, New Age International Edition, 2002. (UNIT V)

REFERENCES

1. Benjamin.C.Kuo, Automatic Control Systems, 7th Edition – Prentice Hall of India, 2002.
2. M.Gopal, Control Systems, Tata McGraw-Hill, 1997

EC1305 TRANSMISSION LINES AND WAVEGUIDES 3 1 0 100

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 TRANSMISSION LINE THEORY 9

Different types of transmission lines – Definition of Characteristic impedance – The transmission line as a cascade of T-Sections - Definition of Propagation Constant.
General Solution of the transmission line – The two standard forms for voltage and current of a line terminated by an impedance – physical significance of the equation and the infinite line – The two standard forms for the input impedance of a transmission line terminated by an impedance – meaning of reflection coefficient – wavelength and velocity of propagation.
Waveform distortion – distortion less transmission line – The telephone cable – Inductance loading of telephone cables.
Input impedance of lossless lines – reflection on a line not terminated by Zo - Transfer impedance – reflection factor and reflection loss – T and ∏ Section equivalent to lines.

UNIT II THE LINE AT RADIO FREQUENCIES 9

Standing waves and standing wave ratio on a line – One eighth wave line – The quarter wave line and impedance matching – the half wave line.
The circle diagram for the dissipationless line – The Smith Chart – Application of the Smith Chart – Conversion from impedance to reflection coefficient and vice-versa. Impedance to Admittance conversion and viceversa – Input impedance of a lossless line terminated by an impedance – single stub matching and double stub matching.

UNIT III GUIDED WAVES 8

Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – characteristics of TE and TM Waves – Transverse Electromagnetic waves – Velocities of propagation – component uniform plane waves between parallel planes – Attenuation of TE and TM waves in parallel plane guides – Wave impedances.

UNIT IV RECTANGULAR WAVEGUIDES 9

Transverse Magnetic Waves in Rectangular Wave guides – Transverse Electric Waves in Rectangular Waveguides – characteristic of TE and TM Waves – Cutoff wavelength and phase velocity – Impossibility of TEM waves in waveguides – Dominant mode in rectangular waveguide – Attenuation of TE and TM modes in rectangular waveguides – Wave impedances – characteristic impedance – Excitation of modes.

UNIT V CIRCULAR WAVE GUIDES AND RESONATORS 10

Bessel functions – Solution of field equations in cylindrical co-ordinates – TM and TE waves in circular guides – wave impedances and characteristic impedance – Dominant mode in circular waveguide – excitation of modes – Microwave cavities, Rectangular cavity resonators, circular cavity resonator, semicircular cavity resonator, Q factor of a cavity resonator for TE101 mode.

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. J.D.Ryder “Networks, Lines and Fields”, PHI, New Delhi, 2003. (Unit I & II)
2. E.C. Jordan and K.G.Balmain “Electro Magnetic Waves and Radiating System, PHI, New Delhi, 2003. (Unit III, IV & V)

REFERENCES

1. Ramo, Whineery and Van Duzer: “Fields and Waves in Communication Electronics” John Wiley, 2003.
2. David M.Pozar: Microwave Engineering – 2nd Edition – John Wiley.
3. David K.Cheng,Field and Waves in Electromagnetism, Pearson Education, 1989.

EC1306 DIGITAL SIGNAL PROCESSING LABORATORY 0 0 3 100

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.
- To implement the IIR and FIR filter using MATLAB.

LIST OF EXPERIMENTS

USING TMS320C5X

1. Study of various addressing modes of DSP using simple programming examples
2. Sampling of input signal and display
3. Implementation of FIR filter
4. Calculation of FFT

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

EC1307 MICROPROCESSOR AND APPLICATIONS LAB 0 0 3 100

1. Programs for 8/16 bit Arithmetic operations (Using 8085).
2. Programs for Sorting and Searching (Using 8085, 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.
10. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051microcontroller.
11. Programming and verifying Timer, Interrupts and UART operations in 8031 microcontroller.
12. Communication between 8051 Microcontroller kit and PC.

MG1351 PRINCIPLES OF MANAGEMENT 3 0 0 100

OBJECTIVE

Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain some basic knowledge on international aspect of management.

1. HISTORICAL DEVELOPMENT 9

Definition of Management – Science or Art – Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organisation.

2. PLANNING **9**

Nature & Purpose – Steps involved in Planning – Objectives – Setting Objectives – Process of Managing by Objectives – Strategies, Policies & Planning Premises- Forecasting – Decision-making.

3.* ORGANISING** ***9

Nature and Purpose – Formal and informal organization – Organization Chart – Structure and Process – Departmentation by difference strategies – Line and Staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process - Techniques – HRD – Managerial Effectiveness.

4.* DIRECTING** ***9

Scope – Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication – Process of Communication – Barriers and Breakdown – Effective Communication – Electronic media in Communication.

5.* CONTROLLING** ***9

System and process of Controlling – Requirements for effective control – The Budget as Control Technique – Information Technology in Controlling – Use of computers in handling the information – Productivity – Problems and Management – Control of Overall Performance – Direct and Preventive Control – Reporting – The Global Environment – Globalization and Liberalization – International Management and Global theory of Management.

TOTAL : 45

TEXT BOOKS

1. Harold Kooritz & Heinz Weihrich “Essentials of Management”, Tata McGraw-Hill,1998
2. Joseph L Massie “Essentials of Management”, Prentice Hall of India, (Pearson) Fourth Edition, 2003.

REFERENCES

1. Tripathy PC And Reddy PN, “ Principles of Management”, Tata McGraw-Hill, 1999.
2. Decenzo David, Robbin Stephen A, ”Personnel and Human Reasons Management”, Prentice Hall of India, 1996
3. JAF Stomer, Freeman R. E and Daniel R Gilbert Management, Pearson Education, Sixth Edition, 2004.
4. Fraidoon Mazda, “Engineering Management”, Addison Wesley,-2000.

EC1351 DIGITAL COMMUNICATION **3 1 0 100**

AIM

To introduce the basic concepts of Digital Communication modulation to baseband, passband modulation and to give an exposure to error control coding and finally to discuss about the spread spectrum modulation schemes.

OBJECTIVES

- To study pulse modulation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals.
- To learn baseband pulse transmission, which deals with the transmission of pulse-amplitude, modulated signals in their baseband form.
- 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 PULSE MODULATION 9

Sampling process –PAM- other forms of pulse modulation –Bandwidth –Noise trade off –Quantization – PCM- Noise considerations in PCM Systems-TDM- Digital multiplexers-Virtues, Limitation and modification of PCM-Delta modulation –Linear prediction –differential pulse code modulation – Adaptive Delta Modulation.

UNIT II BASEBAND PULSE TRANSMISSION

9

Matched Filter- Error Rate due to noise –Intersymbol Interference- Nyquist's criterion for Distortionless Base band Binary Transmission- Correlative level coding –Baseb and M-ary PAM transmission –Adaptive Equalization –Eye patterns

UNIT III PASSBAND DATA TRANSMISSION 9

Introduction – Pass band Transmission model- Generation, Detection, Signal space diagram, bit error probability and Power spectra of BPSK, QPSK, FSK and MSK schemes –Differential phase shift keying – Comparison of Digital modulation systems using a single carrier – Carrier and symbol synchronization.

UNIT IV ERROR CONTROL CODING 9

Discrete memoryless channels – Linear block codes - Cyclic codes - Convolutional codes – Maximum likelihood decoding of convolutional codes-Viterbi Algorithm, Trellis coded Modulation, Turbo codes.

UNIT V SPREAD SPECTRUM MODULATION 9

Pseudo- noise sequences –a notion of spread spectrum – Direct sequence spread spectrum with coherent binary phase shift keying – Signal space Dimensionality and processing gain –Probability of error – Frequency –hop spread spectrum –Maximum length and Gold codes.

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. Simon Haykins, "Communication Systems" John Wiley, 4th Edition, 2001

REFERENCES

1. Sam K.Shanmugam "Analog & Digital Communication" John Wiley.
2. John G.Proakis, "Digital Communication" McGraw Hill 3rd Edition, 1995
3. Taub & Schilling , "Principles of Digital Communication " Tata McGraw-Hill" 28th reprint, 2003
4. Bernard's

CS1302 COMPUTER NETWORKS 3 0 0 100

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 DATA COMMUNICATIONS 8

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences.

UNIT II DAT LINK LAYER 12

Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control: stop and wait – go back N ARQ – selective repeat ARQ- sliding window techniques – HDLC.
LAN: Ethernet IEEE 802.3, IEEE 802.4, and IEEE 802.5 – IEEE 802.11–FDDI, SONET – Bridges.

UNIT III NETWORK LAYER 10

Internetworks - Packet Switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

UNIT IV TRANSPORT LAYER 8

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

UNIT V APPLICATION LAYER 7

Domain Name Space (DNS) – SMTP, FDP, HTTP, WWW – Security – Cryptography.

TOTAL : 45

TEXT BOOKS

1. Behrouz A. Foruzan, "Data communication and Networking", Tata McGraw-Hill, 2004.

REFERENCES

1. James .F. Kurouse & W. Rouse, "Computer Networking: A Topdown Approach Featuring", Pearson Education.
2. Larry L.Peterson & Peter S. Davie, "COMPUTER NETWORKS", Harcourt Asia Pvt. Ltd., Second Edition.
3. Andrew S. Tannenbaum, "Computer Networks", PHI, Fourth Edition, 2003.
4. William Stallings, "Data and Computer Communication", Sixth Edition, Pearson Education, 2000.

EC1352 ANTENNAS AND WAVE PROPAGATION 3 1 0 100

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 RADIATION FIELDS OF WIRE ANTENNAS 9

Concept of vector potential. Modification for time varying, retarded case. Fields associated with Hertzian dipole. Power radiated and radiation resistance of current element. Radiation resistance of elementary dipole with linear current distribution. Radiation from half-wave dipole and quarter-wave monopole. Assumed current distribution for wire antennas. Use of capacity hat and loading coil for short antennas.

UNIT II ANTENNA FUNDAMENTALS AND ANTENNA ARRAYS 9

Definitions: Radiation intensity. Directive gain. Directivity. Power gain. Beam Width. Band Width. Gain and radiation resistance of current element. Half-wave dipole and folded dipole. Reciprocity principle. Effective length and Effective area. Relation between gain effective length and radiation resistance.
Loop Antennas: Radiation from small loop and its radiation resistance. Radiation from a loop with circumference equal to a wavelength and resultant circular polarization on axis.
Helical antenna. Normal mode and axial mode operation.
Antenna Arrays: Expression for electric field from two and three element arrays. Uniform linear array. Method of pattern multiplication. Binomial array. Use of method of images for antennas above ground.

UNIT III TRAVELLING WAVE (WIDEBAND) ANTENNAS 9

Radiation from a traveling wave on a wire. Analysis of Rhombic antenna. Design of Rhombic antennas.

Coupled Antennas: Self and mutual impedance of antennas. Two and three element Yagi antennas. Log periodic antenna. Reason for feeding from end with shorter dipoles and need for transposing the lines. Effects of decreasing α.

UNIT IV APERTURE AND LENS ANTENNAS. 9

Radiation from an elemental area of a plane wave (Huygen's Source). Radiation from the open end of a coaxial line. Radiation from a rectangular aperture treated as an array of Huygen's sources. Equivalence of fields of a slot and complementary dipole. Relation between dipole and slot impedances. Method of feeding slot antennas. Thin slot in an infinite cylinder. Field on the axis of an E-Plane sectoral horn. Radiation from circular aperture. Beam Width and Effective area.
Reflector type of antennas (dish antennas). Dielectric lens and metal plane lens antennas. Lumeberg lens. Spherical waves and Biconical antenna.

UNIT V PROPAGATION 9

The three basic types of propagation; ground wave, space wave and sky wave propagation.
Sky wave propagation: Structure of the ionosphere. Effective dielectric constant of ionized region. Mechanism of refraction. Refractive index. Critical frequency. Skip distance. Effect of earth's magnetic field. Energy loss in the ionosphere due to collisions. Maximum usable frequency. Fading and Diversity reception.
Space wave propagation: Reflection from ground for vertically and horizontally polarized waves. Reflection characteristics of earth. Resultant of direct and reflected ray at the receiver. Duct propagation.
Ground wave propagation: Attenuation characteristics for ground wave propagation. Calculation of field strength at a distance.

TUTORIAL 15

TOTAL : 60

TEXTBOOK

1. E.C.Jordan and Balmain, "Electro Magnetic Waves and Radiating Systems", PHI, 1968, Reprint 2003.

REFERENCES

1. John D.Kraus and Ronalatory Marhefka, "Antennas", Tata McGraw-Hill Book Company, 2002.
2. R.E.Collins, 'Antennas and Radio Propagation ", McGraw-Hill, 1987.
3. Ballany , "Antenna Theory " , John Wiley & Sons, second edition , 2003.

CS1251 COMPUTER ARCHITECTURE 3 0 0 100

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 BASIC STRUCTURE OF COMPUTERS 10

Functional units- Basic Operational Concepts, Bus Structures, Software Performance – Memory locations & addresses – Memory operations – Instruction and instruction sequencing – addressing modes – assembly language – Basic I/O operations – stacks and queues.

UNIT II ARITHMETIC 8

Addition and subtraction of signed numbers – Design of fast adders – multiplication of positive numbers- signed operand multiplication and fast multiplication – Integer division – floating point numbers and operations.

UNIT III BASIC PROCESSING UNIT 9

Fundamental concepts – Execution of a complete Instruction – Multiple bus organization – Hardwired control – microprogrammed control.
Pipelining – Basic concepts – data hazards – instruction hazards – influence on Instruction sets – Data path and control consideration – Superscalar operation.

UNIT IV MEMORY SYSTEM 9

Basic concepts – semiconductor RAMs, ROMs – Speed, size and cost – cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage.

UNIT-V I/O ORGANIZATION 9

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface Circuits – Standard I/O Interfaces (PCI, SCSI, USB).

TOTAL : 45

TEXT BOOKS

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization” 5th Ed, McGraw Hill, 2002.

REFERENCES

1. William Stallings, “Computer Organization & Architecture – Designing for Performance”, 6th Ed., Pearson Education, 2003 reprint.
2. David A.Patterson and John L.Hennessy, “Computer Organization & Design, the hardware / software interface”, 2nd Ed, Morgan Kaufmann, 2002 reprint.
3. John P.Hayes, “Computer Architecture & Organization”, 3rd Ed, McGraw-Hill, 1998.

MA1251 NUMERICAL METHODS 3 1 0 100

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 ,

- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigenvalue problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- 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.
- 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.
- 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+3

Linear interpolation methods (method of false position) – Newton's method – Statement of Fixed Point Theorem – Fixed point iteration: x=g(x) method – Solution of linear system by Gaussian elimination and Gauss-Jordon methods- Iterative methods: Gauss Jacobi and Gauss-Seidel methods- Inverse of a matrix by Gauss Jordon method – Eigenvalue of a matrix by power method.

UNIT II INTERPOLATION AND APPROXIMATION 9+ 3

Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulas.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+ 3

Derivatives from difference tables – Divided differences and finite differences –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two and Three point Gaussian quadrature formulas – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+ 3

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

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9+ 3

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.

TUTORIAL **15**

TOTAL : 60

TEXT BOOKS

1. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
2. Balagurusamy, E., "Numerical Methods", Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 1999.

REFERENCES

1. Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003.
2. Burden, R.L and Faires, T.D., "Numerical Analysis", Seventh Edition, Thomson Asia Pvt. Ltd., Singapore, 2002.

EC1353 COMMUNICATION SYSTEMS LABORATORY 0 0 3 100

LIST OF EXPERIMENTS

1. Radiation pattern of Halfwave dipole Antenna
2. Radiation pattern of yagi Antenna
3. Radiation pattern of loop Antenna
4. Characteristics of AM receiver (Selectivity & Sensitivity)
5. Characteristics of FM receiver (Selectivity & Sensitivity)
6. Sampling & time division multiplexing
7. Pulse modulation- PAM / PWM /PPM
8. Pulse code modulation
9. Line coding & Decoding
10. Delta modulation / Differential pulse code modulation
11. Digital modulation –ASK, PSK, QPSK, FSK

EC1354 NETWORKS LABORATORY 0 0 3 100

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

EC1355 ELECTRONIC SYSTEM DESIGN LAB 0 0 3 100

1. DC power supply design using buck – boost converters

   Design the buck-boost converter for the given input voltage variation, load current and output voltage. Plot the regulation characteristics.

2. DC power supply design using fly back converter (Isolated type)

   Design the fly back converter using ferrite core transformer for the given input voltage variation load current and output voltage.
   Plot the regulation characteristics.

3. Design of a 4-20mA 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.

4. 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.

5. Design of process control timer

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

6. Design of AM / FM modulator / demodulator

   ii. Design AM signal using multiplier IC for the given carrier frequency and modulation index and demodulate the AM signal using envelope detector.
   iii. Design FM signal using VCO IC NE566 for the given carrier frequency and demodulate the same using PLL NE 565.

7. Design of Wireless date modem.

   Design a FSK modulator using 555 and convert it to sine wave using filter and transmit the same using IR LED and demodulate the same PLL NE 565.

8. PCB layout design using CAD

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

9. Microcontroller based systems design

   Design of microcontroller based system for simple applications like security systems combination lock etc. using 89c series flash micro controller.

10. DSP based system design

    Design a DSP based system for simple applications like echo generation, etc. using TMS 320 DSP kit.

MG1401 TOTAL QUALITY MANAGEMENT 3 0 0 100

OBJECTIVE

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
- To understand the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.

1. INTRODUCTION 9

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

2. TQM PRINCIPLES 9

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

3. STATISTICAL PROCESS CONTROL (SPC) 9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

4. TQM TOOLS 9

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

5. QUALITY SYSTEMS 9

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

TOTAL : 45

TEXT BOOK

1. Dale H.Besterfiled, et al., Total Quality Management, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

REFERENCES

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management, McGraw Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.

5. Zeiri. “Total Quality Management for Engineers Wood Head Publishers, 1991.

EC1401 VLSI DESIGN 3 0 0 100

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 9

An overview of Silicon semiconductor technology, Basic CMOS technology : nwell, P well, Twin tub and SOI Process. Interconnects, circuit elements: Resistors, capacitors, Electrically alterable ROMs, bipolar transistors, Latch up and prevention.
Layout design rules, physical design: basic concepts, CAD tool sets, physical design of logic gates: Inverter, NAND, NOR, Design Hierarchies.

UNIT II MOS TRANSISTOR THEORY 9

NMOS, PMOS Enhancement transistor, Threshold voltage, Body effect, MOS DC equations, channel length modulation, Mobility variation, MOS models, small signal AC characteristics, complementary CMOS inverter DC characteristics, Noise Margin, Rise time, fall time, power dissipation, transmission gate, tristate inverter.

UNIT III SPECIFICATION USING VERILOG HDL 9

Basic Concepts: VLSI Design flow, identifiers, gate primitives, value set, ports, gate delays, structural gate level and switch level modeling, Design hierarchies, Behavioral and RTL modeling: Operators, timing controls, Procedural assignments conditional statements, Data flow modeling and RTL.
Structural gate level description of decoder, equality detector, comparator, priority encoder, D-latch, D-ff, half adder, Full adder, Ripple Carry adder.

UNIT IV CMOS CHIP DESIGN 9

Logic design with CMOS: MOSFETS as switches, Basic logic gates in CMOS, Complex logic gates, Transmission gates: Muxes and latches, CMOS chip design options: Full custom ASICs, Std. Cell based ASICs, Gate Array based ASICs Channelled, Channelless and structured GA, Programmable logic structures; 22V10, Programming of PALs, Programmable Interconnect, Reprogrammable GA: Xilinx programmable GA, ASIC design flow.

UNIT V CMOS TESTING 9

Need for testing, manufacturing test principles, Design strategies for test, Chip level and system level test techniques.

TOTAL : 45

TEXT BOOKS

1. Weste & Eshraghian: Principles of CMOS VLSI design (2/e) Addison Wesley, 1993 for UNIT I through UNIT IV.
2. Samir Palnitkar; Verilog HDL - Guide to Digital design and synthesis, III edition, Pearson Education, 2003 for UNIT V

REFERENCES

1. M.J.S.Smith : Application Specific integrated circuits, Pearson Education, 1997.
2. Wayne Wolf, Modern VLSI Design, Pearson Education 2003.
3. Bob Zeidmin ; Introduction to verilog, Prentice Hall, 1999
4. J . Bhaskar : Verilog HDL Primer, BSP, 2002.
5. E. Fabricious , Introduction to VLSI design, McGraw-Hill 1990.
6. C. Roth, Digital Systems Design Using VHDL, Thomson Learning, 2000.

EC1402 OPTICAL COMMUNICATION 3 0 0 100

AIMS

- 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 TO OPTICAL FIBERS 9

Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Mode Fibers-Graded Index fiber structure.

UNIT II SIGNAL DEGRADATION OPTICAL FIBERS 9

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

UNIT III FIBER OPTICAL SOURCES AND COUPLING 9

Direct and indirect Band gap materials-LED structures –Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –

External Quantum efficiency –Resonant frequencies –Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lencing schemes, Fibre –to- Fibre joints, Fibre splicing.

UNIT IV FIBER OPTICAL RECEIVERS 9

PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources – Receiver Configuration –Probability of Error – Quantum Limit.

UNIT V DIGITAL TRANSMISSION SYSTEM 9

Point-to-Point links System considerations –Link Power budget –Rise - time budget –Noise Effects on System Performance-Operational Principles of WDM, Solitons-Erbium-doped Amplifiers. Basic on concepts of SONET/SDH Network. .

TOTAL : 45

TEXT BOOK

1. Gerd Keiser, "Optical Fiber Communication" McGraw –Hill International, Singapore, 3rd ed., 2000

REFERENCES

1. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 1994.
2. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.

EC1403 MICROWAVE ENGINEERING 3 0 0 100

Aim

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

Objectives

- To study passive microwave components and their S- Parameters.
- To study Microwave semiconductor devices & applications.
- To study Microwave sources and amplifiers.

UNIT I 9

Microwave Frequencies, Microwave Devices, Microwave Systems, Microwave Units of Measure, Microwave Hybrid Circuits, Waveguide Tees, Magic Tees (Hybrid Trees), Hybrid Rings (Rat-Race Circuits), Waveguide Corners, Bends and Twists, Directional Couplers, Two-Hole Directional Couplers, Z & ABCD Parameters- Introduction to S parameters, S Matrix of a Directional Coupler, Hybrid Couplers, Circulators and Isolators, Microwave Circulators, Microwave Isolators.

UNIT II 9

Transit time limitations in transistors, Microwave bipolar transistors, power frequency limitations microwave field effect transistors, HEMT, Gunn effect – RWH theory, high – field domain and modes of operation microwave amplification – Avalance transit time devices – IMPATT and TRAPATT diodes and comparison parametric amplifiers.

UNIT III TRANSFERRED ELECTRON DEVICES (TEDs) and AVALANCHE TRANSIT-TIME DEVICES 9

Introduction, Gunn-Effect Diodes – GaAs Diode, Background, Gunn Effect, Ridely-Watkins-Hilsun (RWH) Theory, Differential Negative Resistance, Two-Valley Model Theory, High-Field Domain, Modes of Operation, LSA Diodes, InP Diodes, CdTe Diodes, Microwave Generation and Amplification, Microwave Generation, Microwave Amplification, **AVALANCHE TRANSIT-TIME DEVICES**, Introduction, Read Diode, Physical Description, Avalanche Multiplication, Carrier Current $I_o(t)$ and External Current $I_e(t)$, Output Power and Quality Factor, IMPATT Diodes, Physical Structures, Negative Resistance, Power Output and Efficiency, TRAPATT Diodes, Physical Structures, Principles of Operation, Power Output and Efficiency, BARITT Diodes, Physical Description, Principles of Operation, Microwave Performance, Parametric Devices, Physical Structures, Nonlinear Reactance and Manley – Rowe Power Relations, Parametric Amplifiers, Applications.

UNIT III MICROWAVE LINEAR-BEAM TUBES (O TYPE) and MICROWAVE CROSSED-FIELD TUBES (M TYPE) 9

Klystrons, Reentrant Cavities, Velocity-Modulation Process, Bunching Process, Output Power and Beam Loading, State of the Art, Multicavity Klystron Amplifiers, Beam-Current Density, Output Current Output Power of Two-Cavity Klystron, Output Power of Four-Cavity Klystron, Reflex Klystrons, Velocity Modulation, Power Output and Efficiency, Electronic Admittance, Helix Traveling-Wave Tubes (TWTs), Slow-Wave structures, Amplification Process, Convection Current, Axial Electric Field, Wave Modes, Gain Consideration, **MICROWAVE CROSSED-FIELD TUBES** , Magnetron Oscillators, Cylindrical Magnetron, Coaxial Magnetron, Tunable Magnetron, Ricke diagram.

UNIT IV STRIP LINES and MONOLITHIC MICROWAVE INTEGRATED CIRCUITS 9

Introduction, Microstrip Lines, Characteristic Impedance of Microstrip Lines, Losses in Microstrip Lines, Quality Factor Q of Microstrip Lines, Parallel Strip Lines, Distributed Lines, Characteristic Impedance, Attenuation Losses, Coplanar Strip Lines, Shielded Strip Lines, References, Problems, **MONOLITHIC MICROWAVE INTEGRATED CIRCUITS**, Introduction, Materials, Substrate Materials, Conductor Materials, Dielectric Materials, Resistive Materials, Monolithic Microwave Integrated-Circuit Growth, MMIC Fabrication Techniques, Fabrication Example.

UNIT V MICROWAVE MEASUREMENTS: 9

Slotted line VSWR measurement, VSWR through return loss measurements, power measurement, impedance measurement insertion loss and attenuation measurements- measurement of scattering parameters – Measurement of 1 dB, dielectric constant measurement of a solid using waveguide

TOTAL : 45

TEXT BOOKS

1. Samuel Y.LIAO : Microwave Devices and Circuits – Prentice Hall of India – 3rd Edition (2003)
2. Annapurna Das and Sisir K.Das: Microwave Engineering – Tata McGraw-Hill (2000) (UNIT V)

REFERENCES

1. R.E. Collin : Foundations for Microwave Engg. – IEEE Press Second Edition (2002)
2. David M.POZAR : Microwave Engg. – John Wiley & Sons – 2nd Edition (2003)
3. P.A.RIZZI – Microwave Engg. (Passive ckts) – PH1

EC1404 VLSI LABORATORY 0 0 3 100

1. Study of Simulation using tools

2. Study of Synthesis tools
3. Place and Root and Back annotation for FPGAs
4. Study of development tool for FPGAs for schematic entry and verilog
5. Design of traffic light controller using verilog and above tools
6. Design and simulation of pipelined serial and parallel adder to add/ subract 8 number of size, 12 bits each in 2's complement
7. Design and simulation of back annotated verilog files for multiplying two signed, 8 bit numbers in 2's complement. Design must be pipelined and completely RTL compliant
8. Study of FPGA board (HTTP://www.xess.com) and testing on board LEDs and switches using verilog codes
9. Testing the traffic controller design developed in SI. NO.5 on the FPGA board
10. Design a Realtime Clock (2 digits, 7 segments LED displays each for HRS., MTS, and SECS.) and demonstrate its working on the FPGA board. An expansion card is required for the displays.

EC1405 OPTICAL & MICROWAVE LAB 0 0 3 100

Experiments pertaining to Fiber optics, Optical Communication and Fiber optic sensors:

1. Numerical aperture determination for fibers and Attenuation Measurement in Fibers.
2. Mode Characteristics of Fibres – SM Fibres.
3. Coupling Fibers to Semi-Conductor Sources – Connectors & Splices.
4. Fiber optic communication links.
5. LED & Photo Diode Characteristics.

Microwave experiments

1. VSWR Measurements – Determination of terminated impedance
2. Determination of guide wavelength, frequency measurement.
3. Radiation Pattern of Horns, Paraboloids.
4. Microwave Power Measurement.
5. Characteristics of Gunn diode Oscillator.

EC1451 MOBILE COMMUNICATIONS 3 0 0 100

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 are presented. This unit

also describes the time, frequency code division multiple access techniques as well as more recent multiple access technique such as space division multiple access.

- It deals with second generation and third generation wireless networks and worldwide wireless standards.

UNIT I CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS 9

Introduction to wireless communication: Evolution of mobile communications, mobile radio systems-Examples, trends in cellular radio and personal communications.
Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems.

UNIT II MOBILE RADIO PROPAGATION 9

Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.

UNIT III MODULATION TECHNIQUES AND EQUALIZATION 9

Modulation Techniques: Minimum Shift Keying, Gauss ion MSK, M-ary QAM, M-ary FSK, Orthogonal Frequency Division Multiplexing, Performance of Digital Modulation in Slow-Flat Fading Channels and Frequency Selective Mobile Channels. **Equalization**: Survey of Equalization Techniques, Linear Equalization, Non-linear Equalization, Algorithms for Adaptive Equalization. Diversity Techniques, RAKE receiver.

UNIT IV CODING AND MULTIPLE ACCESS TECHNIQUES 9

Coding: Vocoders, Linear Predictive Coders, Selection of Speech Coders for Mobile Communication, GSM Codec, RS codes for CDPD. **Multiple Access Techniques:** FDMA, TDMA, CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

UNIT V WIRELESS SYSTEMS AND STANDARDS 9

Second Generation and Third Generation Wireless Networks and Standards, WLL, Blue tooth. AMPS, GSM, IS-95 and DECT

TOTAL : 45

TEXT BOOK

1. T.S.Rappaport, "Wireless Communications: Principles and Practice, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.

REFERENCES

1. R. Blake, " Wireless Communication Technology", Thomson Delmar, 2003.
2. W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw-Hill International, 1998.
3. Stephen G. Wilson, " Digital Modulation and Coding", Pearson Education, 2003.

GE 1001 INTELLECTUAL PROPERTY RIGHTS (IPR) 3 0 0 100

UNIT I

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property). **5**

UNIT II

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures. **10**

UNIT III

International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT). **10**

UNIT IV

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition. **10**

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. **10**

TEXT BOOK

1. Subbaram N.R. " Handbook of Indian Patent Law and Practice ", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.

REFERENCES

1. Eli Whitney, United States Patent Number : 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today : Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. [www.ipmatters.net/features/000707_gibbs.html.

GE 1002 INDIAN CONSTITUTION AND SOCIETY 3 0 0 100

UNIT I

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens. **9**

UNIT II

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review. **9**

UNIT III

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts. **9**

UNIT IV

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India. **9**

UNIT V

Society : Nature, Meaning and definition; Indian Social Structure; Castle, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections. **9**

TEXT BOOKS

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

REFERENCES

1. Sharma, Brij Kishore, " Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2. U.R.Gahai, " (1998) Indian Political System ", New Academic Publishing House, Jalaendhar.
3. R.N. Sharma, " Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.
4. Yogendra Singh, " (1997) Social Stratification and Charge in India ", Manohar, New Delhi.

EC1001 ADVANCED MICROPROCESSORS 3 0 0 100

AIM

To learn the architecture and programming of advanced Intel family microprocessors and microcontrollers.

OBJECTIVES

- To introduce the concepts in internal programming model of Intel family of 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 16 bit microcontrollers.
- To introduce the concepts and architecture of RISC processor and ARM.

UNIT I ADVANCED MICROPROCESSOR ARCHITECTURE 9

Internal Microprocessor Architecture-Real mode memory addressing – Protected Mode Memory addressing –Memory paging - Data addressing modes – Program memory addressing modes – Stack memory addressing modes – Data movement instructions – Program control instructions- Arithmetic and Logic Instructions.

UNIT II MODULAR PROGRAMMING AND ITS CONCEPTS 9

Modular programming –Using keyboard and Video display –Data Conversions- Disk files- Interrupt hooks-using assembly languages with C/ C++

UNIT III PENTIUM PROCESSORS 9

Introduction to Pentium Microprocessor – Special Pentium registers- Pentium memory management – New Pentium Instructions –Pentium Processor –Special Pentium pro features – Pentium 4 processor

UNIT-IV 16-BIT MICRO CONTROLLER 9

8096/8097 Architecture-CPU registers –RALU-Internal Program and Data memory Timers-High speed Input and Output –Serial Interface-I/O ports –Interrupts –A/D converter-Watch dog timer –Power down feature –Instruction set- External memory Interfacing –External I/O interfacing.

UNIT V RISC PROCESSORS AND ARM 9

The RISC revolution – Characteristics of RISC Architecture – The Berkeley RISC – Register Windows – Windows and parameter passing – Window overflow – RISC architecture and pipelining – Pipeline bubbles – Accessing external memory in RISC systems – Reducing the branch penalties – Branch prediction – The ARM processors – ARM registers – ARM instructions – The ARM built-in shift mechanism – ARM branch instructions – sequence control – Data movement and memory reference instructions.

TOTAL : 45

TEXT BOOK

8. Barry B.Brey, The Intel Microprocessors 8086/8088, 80, 86, 80286, 80386 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming and interfacing, Prentice Hall of India Private Limited, New Delhi, 2003. (UNIT I, II and III)
9. John Peatman, Design with Microcontroller McGraw Hill Publishing Co Ltd, New Delhi. (UNIT IV)
10. Alan Clements, "The principles of computer Hardware", Oxford University Press, 3rd Edition, 2003. (UNIT V)

REFERENCES

1. Rajkamal, The concepts and feature of micro controllers 68HC11, 8051 and 8096; S Chand Publishers, New Delhi.

EC1002 INTERNET AND JAVA 3 0 0 100

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: 9

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: 9

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: 9

HTTP protocol, Web browsers netscape, Internet explorer, Web site and Web page design, HTML, XML, Dynamic HTML, CGI.

UNIT IV JAVA PROGRAMMING: 9

Language features, Classes, Object and methods, Subclassing and dynamic binding, Multithreading, Overview of class library, Object method serialisation, Remote method invocation, Java script.

UNIT V MISCELLANEOUS TOPICS: 9

E-Commerce, Network operating systems, Web Design case studies.

TOTAL : 45

REFERENCES

1. Dauglas E.Comer, "Internetworking with TCP/IP", Vol. I: 3rd edition, Prentice Hall of India, 1999.
2. Eric Ladd and Jim O'Donnell, "Using HTML 4, XML and Java 1.2", Que Platinum edition, Prentice Hall of India, 1999.
3. William Stallings, "High Speed Networks", Prentice Hall Inc., 1998.

EC1003 COMPUTER HARDWARE AND INTERFACING 3 0 0 100

AIM

To enable the student to get a detailed knowledge of all the hardware components that make up a computer and to understand the different interfaces required for connecting these hardware devices.

OBJECTIVES

- To introduce issues related to CPU and memory.
- To understand the components on the motherboard
- To understand different storage media
- To introduce the features of different I/O peripheral devices and their interfaces.

UNIT I CPU AND MEMORY 9

CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel's CPU – CPU over clocking – over clocking requirements – over clocking the system – over clocking the Intel processors – Essential memory concepts – memory organizations – memory packages – modules – logical memory organizations – memory considerations – memory types – memory techniques – selecting and installing memory.

UNIT II MOTHERBOARDS 9

Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots – form factor – upgrading a mother board – chipsets – north bridge – south bridge – CMOS – CMOS optimization tactics – configuring the standard CMOS setup – motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

UNIT III STORAGE DEVICES 9

The floppy drive – magnetic storage – magnetic recording principles – data and disk organization – floppy drive – hard drive – data organization and hard drive – sector layout – IDE drive standard and features – Hard drive electronics – CD-ROM drive – construction – CDROM electronics – DVD-ROM – DVD media – DVD drive and decoder.

UNIT IV I/O PERIPHERALS 9

Parallel port – signals and timing diagram – IEEE1284 modes – asynchronous communication - serial port signals – video adapters – graphic accelerators – 3D graphics accelerator issues – DirectX – mice – modems – keyboards – sound boards – audio bench marks.

UNIT V BUS ARCHITECTURE 9

Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture.

TOTAL : 45

TEXT BOOK

1. Stephen J.Bigelow, "Trouble Shooting, maintaining and Repairing PCs", Tata McGraw-Hill, New Delhi, 2001.

REFERENCES

1. Craig Zacker & John Rourke, "The complete reference:PC hardware", Tata McGraw-Hill, New Delhi, 2001.
2. Mike Meyers, "Introduction to PC Hardware and Trouble shooting", Tata McGraw-Hill, New Delhi, 2003.

3. B.Govindarajulu, “IBM PC and Clones hardware trouble shooting and maintenance”, Tata McGraw-Hill, New Delhi, 2002.

EC1004 ADVANCED DIGITAL SIGNAL PROCESSING 3 0 0 100

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 study multirate signal processing fundamentals.
- To study the analysis of speech signals.
- To introduce the student to wavelet transforms.

UNIT I PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION 9

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

UNIT II ADAPTIVE SIGNAL PROCESSING 9

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

UNIT III MULTIRATE SIGNAL PROCESSING 9

Decimation by a factor D – Interpolation by a factor I – Filter Design and implementation for sampling rate conversion: Direct form FIR filter structures – Polyphase filter structure.

UNIT IV SPEECH SIGNAL PROCESSING 9

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

UNIT V WAVELET TRANSFORMS 9

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

TOTAL : 45

TEXTBOOKS

1. John G.Proakis, Dimitris G.Manobakis, Digital Signal Processing, Principles, Algorithms and Applications, Third edition, (2000) PHI.
2. Monson H.Hayes – Statistical Digital Signal Processing and Modeling, Wiley, 2002.

REFERENCES

1. L.R.Rabiner and R.W.Schaber, Digital Processing of Speech Signals, Pearson Education (1979).
2. Roberto Crist, Modern Digital Signal Processing, Thomson Brooks/Cole (2004)
3. Raghuveer. M. Rao, Ajit S.Bopardikar, Wavelet Transforms, Introduction to Theory and applications, Pearson Education, Asia, 2000.

EC1005 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY 3 0 0 100

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 9

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 9

Basic principles of RE, CE, RS and CS measurements, EMI measuring instruments- Antennas, LISN, Feed through capacitor, current probe, EMC analyzer and detection t6echnique open area site, shielded anechoic chamber, TEM cell.

UNIT III EMC STANDARD AND REGULATIONS 8

National and Intentional standardizing organizations- FCC, CISPR, ANSI, DOD, IEC, CENEEC, FCC CE and RE standards, CISPR, CE and RE Standards, IEC/EN, CS standards, Frequency assignment - spectrum conversation.

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

TEXT BOOKS

1. Prasad Kodali.V – Engineering Electromagnetic Compatibility – S.Chand&Co – New Delhi – 2000
2. Clayton R.Paul – Introduction to Electromagnetic compatibility – Wiley & Sons – 1992

REFERENCES

1. Keiser – Principles of Electromagnetic Compatibility – Artech House – 3rd Edition – 1994
2. Donwhite Consultant Incorporate – Handbook of EMI / EMC – Vol I - 1985

EC1006 MEDICAL ELECTRONICS 3 0 0 100

AIM

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

OBJECTIVE

- 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 9

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

TEXTBOOKS

1. Leislie Cromwell, “Biomedical instrumentation and measurement”, Prentice Hall of India, New Delhi, 2002.

REFERENCES

1. Khandpur, R.S., “Handbook of Biomedical Instrumentation”, TATA McGraw-Hill, New Delhi, 1997.
2. Joseph J.Carr and John M.Brown, “Introduction to Biomedical equipment Technology”, John Wiley and Sons, New York, 1997.

EC1007 OPERATING SYSTEMS 3 0 0 100

AIM

To have a through 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 SYSTEMS – AN OVERVIEW 8

Introduction to OS - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems. Computer-System Operation – I/O Structure – Storage Structure – Storage Hierarchy – Hardware Protection – Network Structure. System Components – Operating-System Services – System Calls – System Programs – System Structure – Virtual Machines – System Design and Implementation – System Generation.

UNIT II PROCESS MANAGEMENT 10

Process Concept – Process Scheduling – Operations on Processes – Cooperating Process – Interprocess Communication – Communication in client-server systems. Threads – Overview – Multithreading models – Threading issues- CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling – Process Scheduling Models. The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors – Atomic transactions. System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlock.

UNIT III STORAGE MANAGEMENT 10

Storage Management – Background – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging. Virtual Memory – Background – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing. File System Implementation – File Concept – Access Methods – Directory Structure – File – System Mounting – File Sharing – Production. File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management – Efficiency and Performance – Recovery.

UNIT IV I/O SYSTEMS 8

I/O Hardware – Application I/O Interface – Kernel I/O Subsystem – Transforming I/O to Hardware Operations – Streams – Performance. Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management – RAID Structure – Disk Attachment – Stable – Storage Implementation – Tertiary Storage Structure.

UNIT V DISTRIBUTED SYSTEMS 9

Background – Topology – Network Types – Communication – Communication Protocols – Robustness – Design Issues. Naming and Transparency – Remote File Access – Stateful Versus Stateless Service – File Replication. Event Ordering – Mutual Exclusion – Atomicity – Concurrency Control – Deadlock Handling – Election Algorithms – Reaching Agreement.

TOTAL : 45

TEXT BOOK

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts, Windows XP Update", Sixth Edition, John Wiley & Sons (ASIA) Pvt. LTD, 2003

REFERENCES

1. Harvey M. Deitel, Operating Systems, Second Edition, Pearson Education Pvt. Ltd, 2002
2. Andrew S. Tanenbaum, Modern Operating Systems, Prentice Hall of India Pvt. LTD, 2003
3. William Stallings, Operating System Prentice Hall of India, 4th Edition, 2003

EC1008 HIGH SPEED NETWORKS 3 0 0 100

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

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL.
High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements – Architecture of 802.11

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 8

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL 12

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM.

Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 8

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT V PROTOCOLS FOR QOS SUPPORT 8

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL : 45

TEXT BOOK

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003

EC1009 DIGITAL IMAGE PROCESSING 3 0 0 100

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 the image segmentation and representation techniques.

UNIT I DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS 9

Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.

UNIT II IMAGE ENHANCEMENT TECHNIQUES: 9

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Smoothing – Sharpening filters – Homomorphic filtering.

UNIT III IMAGE RESTORATION: 9

Model of Image Degradation/restoration process – Noise models – Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.

UNIT IV IMAGE COMPRESSION 9

Lossless compression: Variable length coding – LZW coding – Bit plane coding- predictive coding-DPCM. Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG, MPEG,Basics of Vector quantization.

UNIT V IMAGE SEGMENTATION AND REPRESENTATION 9

Edge detection – Thresholding - Region Based segmentation – Boundary representation: chair codes-Polygonal approximation – Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors –Simple descriptors- Texture

TOTAL : 45

TEXT BOOKS

1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education 2003.

REFERENCES

1. William K Pratt, Digital Image Processing John Willey (2001)
2. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy (1999).
3. A.K. Jain, PHI, New Delhi (1995)-Fundamentals of Digital Image Processing.
4. Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India, 2000

EC1010 POWER ELECTRONICS 3 0 0 100

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 9

Characteristics of power devices – characteristics of SCR, diac, triac, SCS, GTO, PUJT – power transistors – power FETs – LASCR – two transistor model of SCR – Protection of thyristors against over voltage – over current, dv/dt and di/dt.

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

Converters – single phase – three phase – half controlled and fully controlled rectifiers – Waveforms of load voltage and line current under constant load current – effect of transformer leakage inductance – dual converter.

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

DC motor drives – Induction and synchronous motor drives – switched reluctance and brushless motor drives – Battery charger – SMPS – UPS – induction and dielectric heating.

TOTAL : 45

TEXT BOOKS

1. Muhamed H.Rashid : Power Electronics Circuits, Devices and Applications, 3rd Edn. 2004 PHI.
2. Singh and Kanchandani : Power Electronics, TMH, 1998.

REFERENCES

1. Sen : Power Electronics, TMH, 1987.
2. Dubey : Thyristorised power controllers, Wiley Eastern 1986.
3. Vithayathil : Power Electronics – Principles and applications McGraw-Hill, 1995.
4. Lander : Power Electronics, 3rd Edition, McGraw-Hill, 1994.

EC1011 TELEVISION AND VIDEO ENGINEERING 3 0 0 100

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 8

Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon - vidicon-plumbicon-silicon diode array vidicon-solid

state image scanners- monochrome picture tubes- composite video signal-video signal dimension-horizontal sync. Composition- vertical sync. Details – functions of vertical pulse train – scanning sequence details. Picture signal transmission – positive and negative modulation – VSB transmission sound signal transmission – standard channel bandwidth.

UNIT II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER 9

TV transmitter – TV signal propagation – Interference – TV transmission Antennas – Monochrome TV receiver – RF tuner – UHF, VHF tuner- Digital tuning techniques- AFT-IF subsystems - AGC – Noise cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers requirements and configurations - DC re-insertion - Video amplifier circuits- Sync separation – typical sync processing circuits- Deflection current waveform – Deflection Oscillators – Frame deflection circuits – requirements- Line Deflection circuits – EHT generation – Receiver Antennas.

UNIT III ESSENTIALS OF COLOUR TELEVISION 8

Compatibility – colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals- colour television display tubes- delta – gun-precision – in-line and Trinitron colour picture tubes- purity and convergence- purity and static and dynamic convergence adjustments- pincushion correction techniques- automatic degaussing circuit- grey scale tracking – colour signal transmission- bandwidth- modulation of colour difference signals – weighting factors- Formation of chrominance signal.

UNIT IV COLOUR TELEVISION SYSTEMS: 10

NTSC colour TV system- NTSC colour receiver- limitations of NTSC system – PAL colour TV system – cancellation of phase errors- PAL –D colour system- PAL coder – Pal-Decolour receiver- chromo signal amplifier- separation of U and V signals- colour burst separation – Burst phase Discriminator – ACC amplifier- Reference Oscillator- Ident and colour killer circuits- U and V demodulators- Colour signal matrixing – merits and demerits of the PAL system – SECAM system – merits and demerits of SECAM system.

UNIT V ADVANCED TELEVISION SYSTEMS 10

Satellite TV technology- Cable TV – VCR- Video Disc recording and playback- Tele Text broadcast receiver – digital television – Transmission and reception- projection Television – Flat panel display TV receiver – Sterio sound in TV – 3D TV – EDTV – Digital equipments for TV studios.

TOTAL : 45

TEXT BOOKS

1. R.R.Gulati, " Monochrome Television Practice, Principles, Technology and servcing , Second edition, New age International Publishes, 2004 (Unit I,II,IV and V)
2. R.R.Gulati "Monochrome and colour television ", New age Internationl Publisher, 2003 (Unit I,III and IV)

REFERENCES

1. A.M Dhake, "Television and Video Engineerign", Second edition, TMH, 2003.
2. S.P.Bali, " Colour Television, Theory and Practice", TMH, 1994

CS1018 SOFT COMPUTING 3 0 0 100

AIM

To introduce the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.

OBJECTIVES

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing

UNIT I FUZZY SET THEORY 10

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II OPTIMIZATION 8

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III NEURAL NETWORKS 10

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV NEURO FUZZY MODELING 9

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE 8

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TOTAL : 45

TEXT BOOK

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

REFERENCES

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
2. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.

EC1012 SOLID STATE ELECTRONIC DEVICES 3 0 0 100

AIM

To have fundamental knowledge about structure of devices, VI characteristics of devices like PN Junction diode, Zener diode, MOSFET, BJT and Opto electronic.

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 the VI Characteristics of devices and their limitations in factors like current, power frequency.
- To learn photoelectric effect and fabrication of opto electronic devices.

UNIT I CRYSTAL PROPERTIES AND GROWTH OF SEMICONDUCTORS 9

Semiconductor materials- Periodic Structures- Crystal Lattices- Cubic lattices –Planes and Directions-The Diamond lattice- Bulk Crystal Growth-Starting Materials-Growth of Single Crystal lngots-Wafers-Doping-Epitaxial Growth –Lattice Matching in Epitaxial Growth –Vapor –Phase Epitaxy-Atoms and Electrons-Introduction to Physical Models-Experimental Observations-The Photoelectric Effect-Atomic spectra-The Bohr model- Quantum Mechanics –Probability and the Uncertainty Principle-The Schrodinger Wave Equation –Potential Well Equation –Potential well Problem-Tunneling.

UNIT II ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS 9

Bonding Forces and Energy bands in Solids-Bonding Forces in Solids-Energy Bands-Metals, Semiconductors, and Insulators – Direct and Indirect Semiconductors –Variation of Energy Bands with Alloy Composition-Charge Carriers in Semiconductors-Electrons and Holes-Effective Mass-Intrinsic Material-Extrinsic Material – Electrons and Holes in Quantum Wells-Carrier Concentrations-The Fermi Level-Electron and Hole Concentrations at Equilibrium-Temperature Dependence of Carrier Concentrations-Compensation and Space Charge Neutrality-Drift of Carrier in Electric and Magnetic Fields conductivity and Mobility-Drift and Resistance –Effects of Temperature and Doping on Mobility-High – Field effects-The Hall Effect -invariance of the Fermi level at equilibrium -Excess Carrier in Semiconductors-Optical Absorption- Luminescence-Photoluminescence-Electro luminescence-Carrier

Lifetime and Photoconductivity –Direct Recombination of Electrons and Holes – Indirect Recombination ; Trapping –Steady State Carrier Generation ; Quasi-Fermi Levels-Photoconductive Devices-Diffusion of Carriers-Diffusion of Processes-Diffusion and Drift of Carrier; Built-in Fields-Diffusion and Recombination; The Continuity Equation –Steady state Carrier Injection; Diffusion Length-The Haynes-Shockley Experiment –Gradients in the Quasi-Fermi levels.

UNIT III JUNCTIONS 9

Fabrication of P-N Junctions-Thermal Oxidation-Diffusion –Rapid Thermal Processing-Ion Implantation-Chemical Vapor Deposition Photolithography-Etching –Metallization-Equilibrium Conditions-The Contact Potential-Equilibrium Fermi Levels –Space Charge at a Junction-Forward –and Reverse –Biased Junctions; -Steady state conditions-Qualitative Description Of current flow at a junction-Carrier Injection-Reverse Bias-Reverse –Bias Breakdown-Zener Breakdown –Avalanche Breakdown-Rectifiers-The Breakdown Diode-Transient and AC Conditions –Time variation of stored charge-Reverse Recovery Transient – Switching Diodes –Capacitance of P-N Junctions-The Varactor Diode-Deviations from the Simple Theory-Effects of contact Potential on carrier injection-Recombination and Generation in the Transition Region-Ohmic Losses –Graded Junctions-Metal –Semiconductor Junctions-Schottky Barriers-Rectifying contacts-Ohmic Contacts-Typical Schottky Barriers-Hetrojunctions

UNIT IV THE METAL –SEMICONDUCTOR-FET 9

The GaAS MESFET-The High Electron Mobility Transistor –Short channel Effects-The Metal Insulator Semiconductor FET-Basic Operation and Fabrication –THE ideal MOS Capacitor-Effects of Real Surfaces-Threshold Voltage –MOS capacitance Measurements- current –Voltage Characteristics of MOS Gate Oxides -The MOS Field –Effect Transistor –Output characteristics-Transfer characteristics- Mobility Models-Short channel MOSFET I-V characteristics –Control of Threshold Voltage –Substrate Bias Effects-Sub threshold characteristics –Equivalent Circuit for the MOSFET-MOSFET Scaling and Hot Electron Effects-Drain –Induced Barrier Lowering –short channel and Narrow Width Effect-Gate –Induced Drain Leakage-BJT Fabrication –Minority carrier distribution and Terminal currents-Solution of the Diffusion Equation in the Base Region-Evaluation of the Terminal currents –Current Transfer Ratio-Generalized Biasing –The coupled –Diode Model-Charge control analysis-Switching –cut off –saturation-The switching cycle-Specifications for switching Transistors-other Important Effects-Drift in the base Narrowing – Avalanche Breakdown –Injection level; Thermal Effects-Base Resistance and Emitter Crowding – Gummel –Poon Model-Kirk Effect-Frequency Limitations of Transistors-Capacitance and Charging Times-Transit Time Effects-Webster Effect-High –Frequency Transistors - Heterojunction Bipolar Transistors.

UNIT V OPTOELCTRONIC DEVICES 9

Photodiodes-Current and Voltage in illuminated Junction-Solar Cells-Photo detectors-Noise and Bandwidth of Photo detectors-Light-Emitting Diodes-Light Emitting Materials-Fiber Optic Communications Multilayer Heterojunctions for LEDs- Lasers-Semiconductor lasers-Population Inversion at a Junction Emission Spectra for p-n junction-The Basic Semiconductor lasers-Materials for Semiconductor lasers-Integrated Circuits –Background –Advantages of Integration –Types of Integrated circuits-Monolithic and Hybrid Circuits-Evolution of Integrated Circuits-Monolithic Device Elements CMOS Process Integration – Silicon –on – Insulator (SOI)-Integration of other Circuit Elements –Charge Transfer Devices –Dynamic Effects in MOS capacitors –The basic CCD-Improvements on the Basic Structure –Applications of CCDs-Ultra Large –Scale Integration (ULSI) –Logic devices –Semiconductor Memories-Testing, bonding , and Packaging-Testing –Wire Bonding –Flip-flop Techniques-Packaging

TOTAL : 45

TEXT BOOK

1. Ben.G.Streetman & Sanjan Banerjee Solid State Electronic Devices (5^{th} Edition) PHI Private Ltd, 2003

REFERENCES

1. Yannis Tsividis: Operation & Mode line of The MOS Transistor (2nd Edition) Oxford University Press, 1999
2. Nandita Das Gupta &Aamitava Das Gupta- Semiconductor Devices Modeling a Technology, PHI, 2004.

IT1353 EMBEDDED SYSTEMS 3 0 0 100

AIM

To give sufficient background for undertaking embedded 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, inter-task communication and an exemplary case of MUCOS – IIRTOS.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Definition and Classification – Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits

UNIT II DEVICES AND BUSES FOR DEVICES NETWORK 9

I/O Devices - Device I/O Types and Examples – Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices - '12C', 'USB', 'CAN' and advanced I/O Serial high speed buses- ISA, PCI, PCI-X, cPCI and advanced buses.

UNIT III PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++ 9

Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - Use of Function Calls – Multiple function calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers – Concepts of EMBEDDED PROGRAMMING in C++ - Objected Oriented Programming – Embedded Programming in C++, 'C' Program compilers – Cross compiler – Optimization of memory codes.

UNIT IV REAL TIME OPERATING SYSTEMS – PART - 1 9

Definitions of process, tasks and threads – Clear cut distinction between functions – ISRs and tasks by their characteristics – Operating System Services- Goals – Structures- Kernel - Process Management – Memory Management – Device Management – File System Organisation and Implementation – I/O Subsystems – Interrupt Routines Handling in RTOS, REAL TIME OPERATING SYSTEMS : RTOS Task scheduling models - Handling of task scheduling and latency and deadlines as performance metrics – Co-operative Round Robin Scheduling – Cyclic Scheduling with Time Slicing (Rate Monotonics Co-operative

Scheduling) – Preemptive Scheduling Model strategy by a Scheduler – Critical Section Service by a Preemptive Scheduler – Fixed (Static) Real time scheduling of tasks - INTER PROCESS COMMUNICATION AND SYNCHRONISATION – Shared data problem – Use of Semaphore(s) – Priority Inversion Problem and Deadlock Situations – Inter Process Communications using Signals – Semaphore Flag or mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – Remote Procedure Calls (RPCs).

UNIT V REAL TIME OPERATING SYSTEMS – PART - 2 9

Study of Micro C/OS-II or Vx Works or Any other popular RTOS – RTOS System Level Functions – Task Service Functions – Time Delay Functions – Memory Allocation Related Functions – Semaphore Related Functions – Mailbox Related Functions – Queue Related Functions – Case Studies of Programming with RTOS – Understanding Case Definition – Multiple Tasks and their functions – Creating a list of tasks – Functions and IPCs – Exemplary Coding Steps.

TOTAL : 45

TEXTBOOKS

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint Oct. 2003

REFERENCES

1. Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes,
2. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.
3. Wayne Wolf, Computers as Components; Principles of Embedded Computing System Design – Harcourt India, Morgan Kaufman Publishers, First Indian Reprint 2001
4. Frank Vahid and Tony Givargis, Embedded Systems Design – A unified Hardware /Software Introduction, John Wiley, 2002.

EC1013 WIRELESS NETWORKS 3 0 0 100

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 PHYSICAL AND WIRELESS MAC LAYER ALTERNATIVES 9

Wired transmission techniques: design of wireless modems, power efficiency, out of band radiation, applied wireless transmission techniques, short distance base band transmission, VWB pulse transmission, broad Modems for higher speeds, diversity and smart receiving techniques, random access for data oriented networks, integration of voice and data traffic.

UNIT II WIRELESS NETWORK PLANNING AND OPERATION 9

Wireless networks topologies, cellular topology, cell fundamentals signal to interference ratio calculation, capacity expansion techniques, cell splitting, use of directional antennas for cell sectoring, micro cell

method, overload cells, channels allocation techniques and capacity expansion FCA, channel borrowing techniques, DCA, mobility management, radio resources and power management securities in wireless networks.

UNIT III WIRELESS WAN 9

Mechanism to support a mobile environment, communication in the infrastructure, IS-95 CDMA forward channel, IS – 95 CDMA reverse channel, pallert and frame formats in IS – 95, IMT – 2000; forward channel in W-CDMA and CDMA 2000, reverse channels in W-CDMA and CDMA-2000, GPRS and higher data rates, short messaging service in GPRS mobile application protocols.

UNIT IV WIRELESS LAN 9

Historical overviews of the LAN industry, evolution of the WLAN industry, wireless home networking, IEEE 802.11. The PHY Layer, MAC Layer, wireless ATM, HYPER LAN, HYPER LAN – 2.

UNIT V WPAN ANDGEOLOCATION SYSTEMS 9

IEEE 802.15 WPAN, Home RF, Bluetooth, interface between Bluetooth and 802.11, wireless geolocation technologies for wireless geolocation, geolocation standards for E.911 service.

TOTAL : 45

TEXT BOOKS

1. Kaveh Pahlavan, Prashant Krishnamoorthy, Principles of Wireless Networks, - A united approach - Pearson Education, 2002.

REFERENCES

1. Jochen Schiller, Mobile Communications, Person Education – 2003, 2nd Edn.
2. X.Wang and H.V.Poor, Wireless Communication Systems, Pearson education, 2004.
3. M.Mallick, Mobile and Wireless design essentials, Wiley Publishing Inc. 2003.
4. P.Nicopolitidis, M.S.Obaidat, G.I. papadimitria, A.S. Pomportsis, Wireless Networks, John Wiley & Sons, 2003.

EC1014 TELECOMMUNICATION SWITCHING AND NETWORKS 3 0 0 100

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 9

Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplexing, Time Division Multiplex Loops and Rings. SONET/SDH: SONET Multiplexing Overview, SONET Frame Formats, SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Optical Standards, SONET Networks. SONET Rings: Unidirectional Path-Switched Ring, Bidirectional Line-Switched Ring.

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 SSN07 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 Distribution Service, Digital Satellite Services.

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

TEXTBOOK

1. Bellamy John, “Digital Telephony”, John Wily & Sons, Inc. 3rd edn. 2000.

REFERENCES

1. Viswanathan. T., “Telecommunication Switching System and Networks”, Prentice Hall of India Ltd., 1994.

EC1015 SATELLITE COMMUNICATION 3 0 0 100

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 OVERVIEW OF SATELLITE SYSTEMS, ORBITS AND LAUNCHING METHODS 9

Introduction – Frequency Allocations for Satellite Services – Intelsat – U.S.Domsats – Polar Orbiting Satellites – Problems – Kepler's First Law – Kepler's Second Law – Kepler's Third Law – Definitions of Terms for Earth-orbiting Satellites – Orbital Elements – Apogee and Perigee Heights – Orbital Perturbations – Effects of a Nonspherical Earth – Atmospheric Drag – Inclined Orbits – Calendars – Universal Time – Julian Dates – Sidereal Time – The Orbital Plane – The Geocentric-Equatorial Coordinate System – Earth Station Referred to the IJK Frame – The Topcentric-Horizon Co-ordinate System – The Sub-satellite Point – Predicting Satellite Position.

UNIT II GEOSTATIONARY ORBIT & SPACE SEGMENT 9

Introduction – Antenna Look Angels – The Polar Mount Antenna – Limits of Visibility – Near Geostationary Orbits – Earth Eclipse of Satellite – Sun Transit Outage – Launching Orbits – Problems – Power Supply – Attitude Control – Spinning Satellite Stabilization – Momentum Wheel Stabilization – Station Keeping – Thermal Control – TT&C Subsystem – Transponders – Wideband Receiver – Input Demultiplexer – Power Amplifier – Antenna Subsystem – Morelos – Anik-E – Advanced Tiros-N Spacecraft

UNIT III EARTH SEGMENT & SPACE LINK 9

Introduction – Receive-Only Home TV Systems – Outdoor Unit – Indoor Unit for Analog (FM) TV – Master Antenna TV System – Community Antenna TV System – Transmit-Receive Earth Stations – Problems – Equivalent Isotropic Radiated Power – Transmission Losses – Free-Space Transmission – Feeder Losses – Antenna Misalignment Losses – Fixed Atmospheric and Ionospheric Losses – Link Power Budget Equation – System Noise – Antenna Noise – Amplifier Noise Temperature – Amplifiers in Cascade – Noise Factor – Noise Temperature of Absorptive Networks – Overall System Noise Temperature – Carrier-to-Noise Ratio – Uplink – Saturation Flux Density – Input Back Off – The Earth Station HPA – Downlink – Output Back off – Satellite TWTA Output – Effects of Rain – Uplink rain-fade margin – Downlink rain-fade margin – Combined Uplink and Downlink C/N Ratio – Intermodulation Noise.

UNIT IV SATELLITE ACCESS 9

Single Access – Preassigned FDMA, Demand-Assigned FDMA, SPADE System. Bandwidth-limited a Power-limited TWT amplifier operation, FDMA downlink analysis.
TDMA : Reference Burst; Preamble and Postamble, Carrier recovery, Network synchronization, unique word detection, Traffic Date, Frame Efficiency and Channel capacity, preassigned TDMA, Demand assigned TDMA, Speech Interpolation and Prediction, Downlink analysis for Digital transmission.
Companion of uplink Power requirements for FDMA & TDMA. On-board signal Processing for TDMA / FDMA operation, Satellite switched TDMA.

Code-Division Multiple Access – Direct-Sequence spread spectrum – code signal c(t) – autocorrelation function for c(t) – Acquisition and trackling – Spectrum spreading and dispreading – CDMA throughput – Problems – Network Layers – TCP Link – Satellite Links and TCP – Enhancing TCP Over Satellite Channels Using Standard Mechanisms (RFC-2488) – Requests for comments – Split TCP connections – Asymmetric Channels – Proposed Systems.

UNIT V DIRECT BROADCAST SATELLITE SERVICES 9

Introduction – Orbital Spacings – Power Rating and Number of Transponders – Frequencies and Polarization – Transponder Capacity – Bit Rates for Digital Television – MPEG Compression Standards – Forward Error Correction – Home Receiver Outdoor Unit (ODU) – Home Receiver Indoor Unit (IDU) –

Downlink Analysis – Uplink -Problems - Satellite Mobile Services – VSATs – Radarsat – Global Positioning Satellite System – Orbcomm.

TOTAL : 45

TEXT BOOK

1. Dennis Roddy, Satellite Communications, McGraw-Hill Publication Third edition 2001

REFERENCES

1. Timothy Pratt – Charles Bostian & Jeremy Allmuti, Satellite Communications, John Willy & Sons (Asia) Pvt. Ltd. 2004
2. Wilbur L. Pritchars Henri G.Suyder Hond Robert A.Nelson, Satellite Communication Systems Engineering, Pearson Education Ltd., Second edition 2003.
3. M.Richharia : Satellite Communication Systems (Design Principles Macmillan Press Ltd. Second Edition 2003.

EC1016 ADVANCED ELECTRONIC SYSTEM DESIGN 3 0 0 100

AIM

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

OBJECTIVE

- 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 9

RF behaviour of passive components, Chip components and circuit board considerations, Review of transmission lines, Impedance and admittance transformation, Parallel and series connection of networks, ABCD and scattering parameters, Analysis of amplifier using scattering parameter. RF filter – Basic resonator and filter configurations – Butterworth and Chebyshev filters. Implementation of microstrip filter design. Band pass filter and cascading of band pass filter elements.

UNIT II RF TRANSISTOR AMPLIFIER DESIGN 9

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

TEXT BOOKS

1. Reinhold Luduig and Pavel Bretchko, RF Circuit Design – Theory and Applications, Pearson Education, 2000.
2. Sydney Soclof, "Applications of Analog Integrated Circuits", Prentice Hall of India, 1990.
3. Walter C.Bosshart, "Printed circuit Boards – Design and Technology", TATA McGraw-Hill, 1983.

REFERENCES

1. Keith H.Billings, "Handbook of Switched Mode Supplies" McGraw-Hill Publishing Co., 1989.
2. Michael Jaacob, "Applications and Design with Analog Integrated Circuits" Prentice Hall of India, 1991.
3. Otmar Kigenstein, "Switched Mode Power supplies in Practice", John Wiley and Sons, 1989.
4. Muhammad H.Rashid, Power Electronics – Circuits, Devices and Applications, Prentice Hall of India, 2004.

EC1017 OPTO ELECTRONIC DEVICES 3 0 0 100

AIM

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

OBJECTIVE

- 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

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

UNIT II DISPLAY DEVICES AND LASERS 9

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

UNIT III OPTICAL DETECTION DEVICES 9

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

UNIT IV OPTOELECTRONIC MODULATOR 9

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

UNIT V OPTOELECTRONIC INTEGRATED CIRCUITS 9

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

TOTAL : 45

TEXTBOOK

1. J. Wilson and J.Haukes, "Opto Electronics – An Introduction", Prentice Hall of India Pvt. Ltd., New Delhi, 1995.

REFERENCES

1. Bhattacharya "Semiconductor Opto Electronic Devices", Prentice Hall of India Pvt., Ltd., New Delhi, 1995.
2. Jasprit Singh, "Opto Electronics – As Introduction to materials and devices", McGraw-Hill International Edition, 1998.

EC1018 TELECOMMUNICATION SYSTEM MODELING AND SIMULATION

3 0 0 100

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 OF RANDOM VARIABLES RANDOM PROCESS 9

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 II MODELING OF COMMUNICATION SYSTEMS 9

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 III ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION 9

Quality of estimator, Estimation of SNR, Probability density function and bit error rate, Monte Carlo method, Importance sampling method, Extreme value theory.

UNIT IV SIMULATION AND MODELING METHODOLOGY 9

Simulation environment, Modeling considerations, Performance evaluation techniques, error source simulation, Validation.

UNIT V CASE STUDIES 9

Simulations of QAM digital radio link in environment, Light wave communication link and satellite system.

TOTAL : 45

TEXTBOOK

1. MC.Jeruchim, P.Balaban and Sam K Shanmugam, "Simulation of communication Systems: Modeling, Methodology and Techniques ", Plenum press , New York, 2001.

REFERENCES

1. Averill.M.Law and W.David Kelton,"Simulation Modeling and Analysis", McGraw-Hill Inc., 2000.
2. Geoffrey Gorden, "System Simulation", Prentice Hall of India, 2nd Edition, 1992.
3. W.Turin, "Performance Analysis of Digital Communication Systems", Computer Science Press, New York, 1990.
4. Jerry banks and John S.Carson, "Discrete Event System Simulation", Prentice Hall of India, 1984.

EC1019 RADAR AND NAVIGATIONAL AIDS 3 0 0 100

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 9

Introduction to Radar

Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies – Applications of Radar – The Origins of Radar

The Radar Equation

Introduction- Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio-Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets- Radar cross Section Fluctuations- Transmitter Power-Pulse Repetition Frequency-Antenna Parameters-System losses – Other Radar Equation Considerations

UNIT II 9

MTI and Pulse Doppler Radar

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 9

Detection of Signals in Noise –Introduction – Matched –Filter Receiver –Detection Criteria – Detectors –- Automatic Detector - Integrators - Constant-False-Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction -Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas - Phase Shifters - Frequency-Scan Arrays

Radar Transmitters- Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources - Other aspects of Radar Transmitter.

Radar Receivers - The Radar Receiver - Receiver noise Figure - Superheterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.

UNIT IV 9

Introduction - Introduction - Four methods of Navigation .

Radio Direction Finding - The Loop Antenna - Loop Input Circuits - An Aural Null Direction Finder - The Goniometer - Errors in Direction Finding - Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders - The Commutated Aerial Direction Finder - Range and Accuracy of Direction Finders

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

Hyperbolic Systems of Navigation (Loran and Decca) - Loran-A - Loran-A Equipment - Range and precision of Standard Loran - Loran-C - The Decca Navigation System - Decca Receivers - Range and Accuracy of Decca - The Omega System

UNIT V 9

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)

Doppler Navigation - The Doppler Effect - Beam Configurations -Doppler Frequency Equations - Track Stabilization - Doppler Spectrum - Components of the Doppler Navigation System - Doppler range Equation - Accuracy of Doppler Navigation Systems.

Inertial Navigation - Principles of Operation - Navigation Over the Earth - Components of an Inertial Navigation System - Earth Coordinate Mechanization - Strapped-Down Systems - Accuracy of Inertial Navigation Systems.
Satellite Navigation System - The Transit System - Navstar Global Positioning System (GPS)

TOTAL : 45

TEXTBOOK

1. Merrill I. Skolnik ," Introduction to Radar Systems", Tata McGraw-Hill (3rd Edition) 2003

REFERENCES

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

EC1020 SPEECH PROCESSING 3 0 0 100

AIM

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

OBJECTIVE

- 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 NATURE OF SPEECH SIGNAL 9

Speech production mechanism, Classification of speech, sounds, nature of speech signal, models of speech production.
Speech signal processing: purpose of speech processing, digital models for speech signal, Digital processing of speech signals, Significance, short time analysis.

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING 9

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

UNIT III FREQUENCY DOMAIN METHODS FOR SPEECH PROCESSING 9

Short time Fourier analysis, filter bank analysis, spectrographic analysis, Format extraction, pitch extraction, Analysis - synthesis systems.

UNIT IV LINEAR PREDICTIVE CODING OF SPEECH 9

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

UNIT V HOMOMORPHIC SPEECH ANALYSIS 9

Central analysis of speech, format and pitch estimation, Applications of speech processing - Speech recognition, Speech synthesis and speaker verification.

TOTAL : 45

TEXTBOOK

1. L.R. Rabiner and R.E Schafer : Digital processing of speech signals, Prentice Hall, 1978.

REFERENCES

1. J.L Flanagan : Speech Analysis Synthesis and Perception - 2nd Edition - Sprenger Vertag, 1972.
2. I.H.Witten :Principles of Computer Speech , Academic press, 1983.

EC1021 REMOTE SENSING 3 0 0 100

UNIT 1 REMOTE SENSING 9

Definition – Components of Remote Sensing – Energy, Sensor, Interacting Body - Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Repetivity – Electro Magnetic Radiation (EMR) – EMR spectrum – Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave – Black Body Radiation - Planck's law – Stefan-Boltzman law.

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Materials – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces- Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface:Imaging spectrometry and spectral characteristics.

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING 9

Satellites - Classification – Based on Orbits and Purpose – Satellite Sensors - Resolution – Description of Multi Spectral Scanning – Along and Across Track Scanners – Description of Sensors in Landsat, SPOT, IRS series – Current Satellites - Radar – Speckle - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar – Radiometer – Geometrical characteristics ; Sonar remote sensing systems.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters

***UNI*T V MISCELLANEOUS TOPICS 9**

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications- Integration of GIS and

Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems. Global positioning system – an introduction.

TOTAL : 45

TEXT BOOKS

1. M.G. Srinivas(Edited by), Remote Sensing Applications, Narosa Publishing House, 2001. (Units 1 & 2).
2. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001 (Units 3, 4 & 5).

REFERENCES

1. Jensen, J.R., Remote sensing of the environment, Prentice Hall, 2000.
2. Kang-Tsung Chang,"Introduction to Geograhic Information Systems", TMH, 2002
3. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley and Sons, Inc, New York, 1987.
4. Janza.F.J., Blue, H.M., and Johnston, J.E., "Manual of Remote Sensing Vol. I., American Society of Photogrammetry, Virginia, U.S.A, 1975.
5. Burrough P A, "Principle of GIS for land resource assessment", Oxford
6. Mischael Hord, "Remote Sensing Methods and Applications", John Wiley & Sons, New York, 1986.
7. Singal, "Remote Sening", Tata McGraw-Hill, New Delhi, 1990.
8. Floyd F. Sabins, Remote sensing, "Principles and interpretation", W H Freeman and Company 1996.
9. http://www.research.umbc.edu/
10. http://rst.gsfc.nasa.gov/start.html
11. IEEE Transactions on Geo-science and Remote sensing.
12. Manual of Remote Sensing – American society of photogrammetry & remote sensing, 1993.

EC1022 OBJECT ORIENTED PROGRAMMING 3 0 0 100

AIM

To present the concept of object oriented programming and discuss the important elements of C++ and Java.

OBJECTIVES

Since C++ and Java play a predominant role in software development it is felt that the following objectives can be achieved after studying this subject.

- Understand the concepts of Object oriented Programming.
- Write simple applications using C++ and Java.
- Compare and contrast features of C++ and Java.

UNIT I **9**

Why Object-Oriented Programming in C++?- Native Types and Statements -Functions and Pointers-Implementing ADTs in the Base Language-

UNIT II **9**

Data Hiding and Member Functions- Object Creation and Destruction-AdHoc Polymorphism-Visitation: Iterators and Containers.

UNIT III **9**

Templates, Generic Programming, and STL-Inheritance-Exceptions-OOP Using C++

UNIT IV **9**

An overview of Java, data types, variables and arrays, operators, control statements, classes, objects, methods – Inheritance

UNIT V **9**

Packages and Interfaces, Exception handling, Multithreaded programming, Strings, Input/Output

TOTAL : 45

TEXTBOOK

1. Ira Pohl, "Object-Oriented Programming Using C++", Pearson Education Asia, 2003.
2. Herbert Schildt, "The Java 2: Complete Reference", Fourth edition, TMH, 2002 (Chapters 1-11,13,17)

REFERENCES

1. Bjarne Stroustrup, "The C++ Programming Language", Pearson Education, 2004.
2. Stanley B. Lippman and Josee Lajoie , "C++ Primer", Pearson Education, 2003.
3. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003.
4. H.M.Deitel, P.J.Deitel, "Java : how to program", Fifth edition, Prentice Hall of India private limited, 2003.

EC1023 ENGINEERING ACOUSTICS **3 0 0 100**

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 9

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves – Energy density – Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales.

Reflection and Transmission:

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

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES 9

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 9

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

Noise, spectrum level and band level – combing band levels and tones – detecting signals in noise – detection threshold – the ear – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS: 9

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 9

Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker – loudspeaker cabinets – horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers.

TOTAL : 45

TEXT BOOKS

1. Lawerence E.Kinsler, Austin, R.Frey, Alan B.Coppens, James V.Sanders, Fundamentals of Acoustics, 4ht edition, Wiley, 2000.

REFERENCES

1. L.Berarek , “Acoustics” - McGraw-Hill