ANNA UNIVERSITY TIRUCHIRAPPALLI
Tiruchirappalli – 620 024

Regulations 2008

Syllabus

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER III

MA1201 – TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all branches)

L	T	P	C
3	1	0	4

UNIT I FOURIER SERIES **9**

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 identity – Harmonic analysis.

UNIT II FOURIER TRANSFORMS **9**

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

UNIT III PARTIAL DIFFERENTIAL EQUATIONS **9**

Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations – Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **9**

Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V Z -TRANSFORMS AND DIFFERENCE EQUATIONS **9**

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

L : 45 T : 15 Total: 60

TEXT BOOK

1. Grewal, B. S., "Higher Engineering Mathematics", 4th Edition, Khanna Publishers, 2007.

REFERENCES

1. Bali, N. P, and Manish Goyal., "A Textbook of Engineering Mathematics", 7th Edition, Laxmi publications private ltd, 2008.
2. Ramana, B. V., "Higher Engineering Mathematics", 2nd Edition, TMH publishing company limited, 2008.
3. Glyn James., "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2008.
4. Erwin Kreyszig., "Advanced Engineering Mathematics", 8th Edition, Wiley India, 2008.

EE1204 – ELECTRICAL ENGINEERING

L	T	P	C
3	0	0	3

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 INDUCTIONMOTORS 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 and distribution systems – EHVAC and EHVDC transmission systems – Substation layout – Insulators – Cables.

Total : 45

TEXT BOOKS

1. Kothari, D. P, and Nagrath, I. J., "Basic Electrical Engineering", 2nd Edition, TMH Publishing Company Ltd, 2007.
2. Wadhwa, C.L., "Electrical Power Systems", 4th Edition, New Age International, 2007.

REFERENCES

1. Bhattacharya, S. K., "Electrical Machines", 2nd Edition, TMH publishing company ltd, 2007.
2. Mehta, V. K, and Rohit Mehta., "Principles of Power System", 2nd Edition, S. Chand and Company Ltd, 2006.

CS1201 – DATA STRUCTURES

L	T	P	C
3	0	0	3

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 9

Tokens – Expressions – Control structures – Functions in C++ – Classes and objects – Constructors and destructors – Operator overloading and type conversions.

UNIT II ADVANCED OBJECT ORIENTED PROGRAMMING 9

Inheritance – Extending classes – Pointers – Virtual functions and polymorphism – File handling templates – Exception handling – Manipulating strings.

UNIT III DATA STRUCTURES AND ALGORITHMS 9

Algorithm analysis – Lists – Stacks and queues – Priority queues – Binary heap – Application – Heaps – Hashing – Hash tables without linked lists.

UNIT IV NONLINEAR DATA STRUCTURES 9

Trees – Binary trees, search tree ADT – AVL trees – Graph algorithms –Topological sort – Shortest path algorithm network flow problems – Minimum spanning tree – NP-completeness.

UNIT V SORTING AND SEARCHING 9

Sorting – Insertion sort – Shell sort – Heap sort – Merge sort – Quick sort – Indirect sorting – Bucket sort – Algorithm design techniques – Greedy algorithm (minimum spanning tree) – Divide and conquer (merge sort) – Dynamic programming (all pairs shortest path problem).

L : 45 T : 15 Total: 60

TEXT BOOKS

1. Sahni., "Data Structures Using C++", 2nd Edition, TMH, 2006.
2. Balagurusamy, E., "Object Oriented Programming with C++", 4th Edition, TMH Company Ltd, 2007.

REFERENCES

1. Michael T. Goodrich, "Data Structures and Algorithm Analysis in C++", Wiley Student Edition, 2007.
2. Seymour., "Data Structures", 6th Edition, TMH, 2007.
3. Jean Paul Tremblay & Paul G. Sorenson., "An Introduction to Data Structures with Applications", 2nd Edition, TMH, 2002.
4. John R. Hubbard., "Schaum's Outline of Theory and Problem of Data Structure with C++", 3rd Edition, TMH, 2000.

EC1201 – DIGITAL ELECTRONICS

L	T	P	C
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UNIT I BOOLEAN ALGEBRA AND MINIMIZATION 9

Basic theorems – Boolean functions – Canonical and Standard forms – Minimization techniques – K-map up to five variables – NAND and NOR implementation – Exclusive-OR function - Hardware Description Language (HDL).

UNIT II DIGITAL LOGIC FAMILIES 9

Switching operation of PN junction diode – bipolar and MOS devices – Bipolar logic families – RTL – DTL – DCTL – HTL – TTL – ECL – MOS and CMOS – Tristate logic –Interfacing of CMOS and TTL families.

UNIT III COMBINATIONAL LOGIC DESIGN 9

Design using gates – BCD arithmetic circuits – Binary adder – Subtractor – Multiplier – Divider – Design using MSI devices – Multiplexer and Demultiplexer as logic elements – Encoder and decoder – Parity checker – Parity generator – Code converter – Magnitude comparator.

UNIT IV SEQUENTIAL LOGIC DESIGN 9

Flip Flops and their conversions – Analysis and synthesis of synchronous sequential circuits – Excitation table – State table and state diagram – Design of synchronous counters – Analysis of asynchronous sequential circuits – Reduction of state and flow table – Race free state assignment – Design of Asynchronous counters – Timing diagram – Shift registers and their applications.

UNIT V MEMORY DEVICES 9

Classification of memories – ROM organization – PROM – EPROM – EEPROM – EAPROM – 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 – Programmable Logic Devices – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) –Field Programmable Gate Arrays (FPGA).

Total: 45

TEXT BOOKS

1. Morris Mano M., “Digital Design”, 3rd Edition, Pearson Education, 2007.
2. John M Yarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2002.

REFERENCES

1. John F.Wakerly, “Digital Design”, 4th Edition, Pearson/PHI, 2006
2. Charles H.Roth, “ Fundamentals of Logic Design”, Thomson Learning, 2003.
3. Donald P.Leach and Albert Paul Malvino, “Digital Principles and Applications”, 6th Edition, TMH, 2003.

EC1202 – SIGNALS AND SYSTEMS

L	T	P	C
3	1	0	4

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9

Continuous Time signals (CT signals) – Discrete Time signals (DT signals) – Step – Ramp – Pulse – Impulse – Exponential – Classification of CT and DT signals – Periodic and Aperiodic – Random signals – CT systems and DT systems – Basic properties of systems – Linear time invariant systems and properties.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 9

Fourier series analysis – Spectrum of CT signals – Fourier transform and Laplace transform in signal analysis.

UNIT III LINEAR TIME INVARIANT – CONTINUOUS TIME SYSTEMS 9

Differential equation – Block diagram representation – Impulse response – Convolution integral – Frequency response – Fourier and Laplace transforms in analysis – State variable equations and matrix representation of systems.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 9

Sampling of CT signals and aliasing – DTFT and properties – Z-transform and properties of Z-transform.

UNIT V LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS 9

Difference equations – Block diagram representation – Impulse response – Convolution sum – LTI systems analysis using DTFT and Z-transforms – State variable equations and matrix representation of systems.

L : 45 T : 15 Total: 60

TEXT BOOKS

1. Ramakrishna Rao, P., “Signals and Systems”, 2nd Edition, TMH, 2008.
2. Allan V. Oppenheim, Wilsky, S, and Nawab, S. H., “Signals and Systems”, 8th Edition, Pearson Education, 2007.

REFERENCES

1. Simon Haykins and Barry Van Veen., “Signals and Systems”, 16th Edition, John Wiley and Sons, 2004.
2. Robert A. Gabel and Richard A. Roberts., “Signals and Linear Systems”, 3rd Edition, John Wiley, 1987.
3. Rodger E. Ziemer, William H. Tranter and Ronald Fannin, D., “Signals & Systems”, 4th Edition, Pearson Education, 2002.
4. Chen, C.T., “Linear System Theory and Design”, 14th Edition, Holt, Rinehart & Winston, Inc, 1984.

EC1203 – ELECTRONIC CIRCUITS I

L	T	P	C
3	0	0	3

UNIT I TRANSISTOR BIASING 9

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

UNIT II 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 – Methods of increasing input impedance using darlington connection and bootstrapping – CS, CG and CD (FET) amplifiers – Multistage amplifiers – Base emitter coupled differential amplifier circuit – Bisection theorem – Differential gain – CMRR – Use of constant current circuit to improve CMRR – Derivation of transfer characteristic.

UNIT III FREQUENCY RESPONSE 9

General shape of frequency response of amplifiers – Definition of cutoff frequencies and bandwidth – Low frequency analysis of amplifiers to obtain lower cutoff frequency hybrid – π equivalent circuit of BJT'S - High frequency analysis of BJT amplifiers to obtain upper cutoff frequency – Gain bandwidth product - High frequency equivalent circuit of FET'S – High frequency analysis of FET amplifiers – Gain – Bandwidth product of FET'S – General expression for frequency response of multistage amplifiers – Calculation of overall upper and lower cutoff frequencies of multistage amplifiers – Amplifier rise time and sag, and their relation to cutoff frequencies.

UNIT IV LARGE SIGNAL AMPLIFIERS 9

Classification of amplifiers – Class A large signal amplifiers – Second harmonic distortion – Higher order harmonic distortion – Transformer coupled class A audio power amplifier – Efficiency of Class A amplifiers – Class B amplifier – Efficiency – Push-pull amplifier – Distortion in amplifiers – Complementary – Symmetry (class B) push-pull amplifier – Class C – Class D amplifier – Class S amplifier – MOSFET power amplifier – Thermal stability and heat sink.

UNIT V FEEDBACK AMPLIFIERS 9

Block diagram – Loop gain – Gain with feedback – Effects of negative feedback – Sensitivity and desensitivity of gain – Cut-off frequencies – Distortion – Noise – Input impedance and output impedance with feedback – Four types of negative feedback connections – Voltage series feedback – Voltage shunt feedback – Current series feedback and current shunt feedback – Method of identifying feedback topology and feedback factor – Nyquist criterion for stability of feedback amplifiers.

Total : 45

TEXT BOOKS

1. Millman, J, and Halkias, C., “Integrated Electronics”, 4th Edition, TMH, 2007.
2. Robert L. Boylestad and Louis Nashelsky., “Electronic Devices and Circuit Theory”, 9th Edition, Pearson Education / PHI, 2007.

REFERENCES

1. David A. Bell., “Electronic Devices and Circuits”, 4th Edition, PHI, 2007.
2. Floyd., “Electronic Devices”, 6th Edition, Pearson Education, 2002.
3. Anwar A. Khan and Kanchan K. Dey., “A First Course on Electronics”, PHI, 2006.
4. Singh, B. P, and Rekha Singh., “Electronic Devices and Integrated Circuits”, Pearson Education, 2006.

EC1204 – DIGITAL ELECTRONICS LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Design and implementation of adder and subtractor using logic gates.
2. Design and implementation of code converters using logic gates.
   (i) BCD to Excess-3 code and vice-versa
   (ii) Binary to Gray and vice-versa
3. Design and implementation of 4-bit binary adder/ subtractor and BCD adder using IC 7483.
4. Design and implementation of 2-bit magnitude comparator using logic gates and 8-bit magnitude comparator using IC 7485.
5. Design and implementation of 16-bit odd/even parity checker and generator using IC74180.
6. Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154.
7. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147.
8. Construction and verification of 4-bit ripple counter and mod-10 / mod-12 ripple counters.
9. Design and implementation of 3-bit synchronous up/down counter.
10. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip-flops.
11. Design of experiments 1, 6, 8 and 10 using Verilog Hardware Description Language (VHDL).

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Digital Trainer kit	6
2.	HDL Compiler single user License	1
3	Required quantity of PCs and Digital ICs as per syllabus for conducting the experiments	

EC1205 – ELECTRONIC CIRCUITS I LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Fixed bias amplifier circuit using BJT
    a) Waveforms at input and output without bias.
    b) Determination of bias resistance to locate Q-point at center of load line.
    c) Measurement of gain.
    d) Plot the frequency response & determination of gain bandwidth product

2. Design and construct BJT common emitter amplifier using voltage divider bias (self-bias) with and without bypassed emitter resistor.
    a) Measurement of gain.
    b) Plot the frequency response & determination of gain bandwidth product

3. Design and construct BJT common collector amplifier using voltage divider bias (self-bias).
    a) Measurement of gain.
    b) Plot the frequency response & determination of gain bandwidth product

4. Darlington amplifier using BJT.
    a) Measurement of gain and input resistance.
    b) Comparison with calculated values.
    c) Plot the frequency response & determination of gain bandwidth product

5. Source follower with bootstrapped gate resistance
    a) Measurement of gain, input resistance and output resistance with and without bootstrapping.
    b) Comparison with calculated values.

6. Differential amplifier using BJT
    a) Measurement of CMRR.

7. Class A power amplifier
    a) Observation of output waveform.
    b) Measurement of maximum power output.
    c) Determination of efficiency.
    d) Comparison with calculated values.

8. Class B complementary symmetry power amplifier
    a) Observation of the output waveform with crossover distortion.
    b) Modification of the circuit to avoid crossover distortion.
    c) Measurement of maximum power output.
    d) Determination of efficiency.
    e) Comparison with calculated values.

9. Power supply circuit – Half wave rectifier with simple capacitor filter.
    a) Measurement of DC voltage under load and ripple factor, comparison with calculated values.
    b) Plot the load regulation characteristics using zener diode.

10. Power supply circuit – Full wave rectifier with simple capacitor filter.
    a) Measurement of DC voltage under load and ripple factor, comparison with calculated values.
    b) Measurement of load regulation characteristics, comparison with calculated values.

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	CRO (30/60 MHz)	6
2.	Function generator (1 MHz Range)	6
3	Regulated Power supply (0-30)	5
4	Dual Power supply (±15V/± 12V)	1
5	Bread boards	6
6	Transformer and consumables as required	

CS1203 – DATA STRUCTURES LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Basic programs for C++ concepts
2. Array implementation of list Abstract Data Type (ADT)
3. Linked list implementation of list ADT
4. Cursor implementation of list ADT
5. Stack ADT – Array and linked list implementations.

The next two exercises are to be done by implementing the following source files
(a) Program source files for stack application 1
(b) Array implementation of stack ADT
(c) Linked list implementation of stack ADT
(d) Program source files for stack application 2
An appropriate header file for the stack ADT should be #included in (a) and (d)

6. Implement any stack application using array implementation of stack ADT (by implementing files (a) and (b) given above) and then using linked list implementation of stack ADT (by using files (a) and implementing file (c))
7. Queue ADT – Array and linked list implementations
8. Search tree ADT – binary search tree
9. Heap sort
10. Quick sort

Total: 45

SEMESTER IV

MA1253 – PROBABILITY AND RANDOM PROCESSES

L	T	P	C
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UNIT I RANDOM VARIABLES 9

Discrete and continuous random variables – Moments – Moment generating functions and their properties – Binomial – Poisson – Geometric – Uniform – Exponential – Gamma and normal distributions – Function of random variable.

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and regression – Transformation of random variables – Central limit theorem (for IID random variables).

UNIT III CLASSIFICATION OF RANDOM PROCESSES 9

Definition and examples – First order – Second order – Strictly stationary – Wide-sense stationary and ergodic process – Markov process – Binomial – Poisson and normal process – Sine wave process – Random telegraph process.

UNIT IV CORRELATION AND SPECTRAL DENSITY 9

Auto correlation – Cross correlation – Properties – Power spectral density – Cross spectral density – Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function .

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS 9

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

L : 45 T : 15 Total: 60

TEXT BOOKS

1. Oliver C. Ibe., "Fundamentals of Applied Probability and Random Processes", Elsevier, First Indian Reprint, 2007.
2. Peebles Jr. P.Z., "Probability Random Variables and Random Signal Principles", 4th Edition, TMH Publishers, 2002.

REFERENCES

1. Miller, S. L and Childers, S. L., "Probability and Random Processes with Applications to Signal Processing and Communications", Elsevier Inc., First Indian Reprint, 2007.
2. Stark, H and Woods, J. W., "Probability and Random Processes with Applications to Signal Processing", 3rd Edition, Pearson Education, 2002.
3. Hwei Hsu., "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", 8th edition, TMH, 2004.
4. Leon Garcia, A., "Probability and Random Processes for Electrical Engineering", 2nd Edition, Pearson Education, 2007.
5. Yates and Goodman, D. J., "Probability and Stochastic Processes", 2nd Edition John Wiley and Sons, 2005.

EC1251 – ELECTRONIC CIRCUITS II

L	T	P	C
3	1	0	4

UNIT I RECTIFIERS AND POWER SUPPLIES 9

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

UNIT II OSCILLATORS 9

Classification – Barkhausen criterion – Mechanism for start of oscillation and stabilization of amplitude – General form of an oscillator – Analysis of LC oscillators – Hartley – Colpitts – Clapp – Franklin – Armstrong – Tuned collector oscillators – RC oscillators – Phase Shift – Wien's bridge – Twin-T oscillators – Frequency response of RC and LC oscillators – Quartz crystal construction – Electrical equivalent circuit of crystal – Miller and Pierce crystal oscillators – Frequency stability of oscillators.

UNIT III TUNED AMPLIFIERS 9

Coil losses – Unloaded and loaded Q of tank circuits – Small signal tuned amplifiers – Analysis of capacitor coupled single tuned amplifier – Double tuned amplifier – Effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers – Large signal tuned amplifiers – Class C tuned amplifier – Efficiency and applications of Class C tuned amplifier – Stability of tuned amplifiers – Neutralization – Hazeltine neutralization method.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

RC & RL integrator and differentiator circuits – Storage – Delay and calculation of transistor switching times – Speed-up capacitor – Diode clippers – Diode comparator – Clampers – Collector coupled and emitter coupled astable multivibrator – Monostable multivibrator – Bistable multivibrators – Triggering methods for bistable multivibrators – Schmitt trigger circuit.

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS 9

UJT sawtooth waveform generator – Pulse transformers – Equivalent circuit – Response – Applications – Blocking oscillator – Free running blocking oscillator – Astable blocking oscillators with base timing – Push-pull astable blocking oscillator with emitter timing – Frequency control using core saturation – Triggered blocking oscillator – Monostable blocking oscillator with base timing – Monostable blocking oscillator with emitter timing – Time base circuits – Voltage-time base circuit – Current-time base circuit – Linearization through adjustment of driving waveform.

Total: 45

TEXT BOOKS

1. Millman, J and Taub, H., "Pulse Digital and Switching Waveforms", 2nd Edition, TMH, 2000.
2. Sedra / Smith., "Micro Electronic Circuits", 5th Edition, Oxford University Press, 2004.

REFERENCES

1. Schilling and Belove., "Electronic Circuits", 3rd Edition, TMH, 2002.
2. Robert L. Boylestad and Louis Nasheresky., "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education / PHI, 2002.
3. David A. Bell., "Solid State Pulse Circuits", 8th Edition, PHI, 1992.

EC1252 – COMMUNICATION THEORY

L	T	P	C
3	1	0	4

UNIT 1 AMPLITUDE MODULATION SYSTEMS 10

Review of spectral characteristics of periodic and non-periodic signals – Generation and demodulation of AM, DSBSC, SSB and VSB signals – Comparison of amplitude modulation systems – Frequency translation – FDM – Non-linear distortion.

UNIT II ANGLE MODULATION SYSTEMS 8

Phase and frequency modulation – Single tone – Narrow band and wideband FM – Transmission bandwidth – Generation and demodulation of FM signal.

UNIT III NOISE THEORY 8

Review of probability – Random variables and random process – Gaussian process – Noise – Shot noise – Thermal noise and white noise – Narrow band noise – Noise temperature – Noise figure.

UNIT IV PERFORMANCE OF CW MODULATION SYSTEMS 10

Superheterodyne radio receiver and its characteristic – SNR – Noise in DSBSC systems using coherent detection – Noise in AM system using envelope detection FM system – FM threshold effect – Pre-emphasis and de-emphasis in FM – Comparison of performances.

UNIT V INFORMATION THEORY 9

Discrete messages and information content – Concept of amount of information – Average information – Entropy – Information rate – Source coding to increase average information per bit – Shannon-fano coding – Huffman coding – Lempel-Ziv (LZ) coding – Shannon's theorem – Channel capacity – Bandwidth – S/N trade-off – Mutual information and channel capacity – Rate distortion theory – Lossy source coding.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Dennis Roddy and John Coolen., "Electronic Communication", 4th Edition, PHI,1995.
2. Herbert Taub and Donald L Schilling., "Principles of Communication Systems", 3rd Edition, TMH, 2008.

REFERENCES

1. Simon Haykin., "Communication Systems", 4th Edition, John Wiley and Sons, 2001.
2. Bruce Carlson., "Communication Systems", 3rd Edition, TMH, 1996.
3. Lathi, B. P., "Modern Digital and Analog Communication Systems", 3rd Edition, Oxford Press, 2007.
4. John G. Proakis, Masoud Salehi., "Fundamentals of Communication Systems", 5th Edition, Pearson Education, 2006.

EC1253 – ELECTROMAGNETIC FIELDS

L	T	P	C
3	1	0	4

UNIT I STATIC ELECTRIC FIELDS 9

Co-ordinate system – Rectangular – Cylindrical and spherical co-ordinate system – Line – Surface and volume integrals – Definition of curl – Divergence and gradient – Meaning of stokes theorem and divergence theorem – Coulomb's law in vector form – Definition of electric field intensity – Principle of superposition – Electric field due to discrete charges – Electric field due to continuous charge distribution – Electric field due to charges distributed uniformly on an infinite and finite line – Electric field on the axis of a uniformly charged circular disc – Electric field due to an infinite uniformly charged sheet – Electric scalar potential – Relationship between potential and electric field – Potential due to infinite uniformly charged line – Potential due to electrical dipole – Electric flux 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 – Pointing vector and the flow of power – Power flow in a co-axial cable – Instantaneous average and complex pointing 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.

L : 45 T : 15 Total: 60

TEXTBOOKS

1. Hayt, W H. and Buck, J. A., “Engineering Electromagnetics”, 7th Edition, TMH, 2007.
2. Jordan, E. C, and Balmain, K. G., “Electromagnetic Waves and Radiating Systems”, 4th Edition, Pearson Education/PHI, 2006.

REFERENCES

1. Mathew N. O. Sadiku, “Elements of Engineering Electromagnetics”, 4th Edition, Oxford University Press, 2007.
2. Narayana Rao, N., “Elements of Engineering Electromagnetics”, 6th Edition, Pearson Education, 2006.
3. Ramo, Whinnery and Van Duzer., “Fields and Waves in Communication Electronics”, 3rd Edition, John Wiley and Sons, 2003.
4. David K. Cheng., “Field and Wave Electromagnetics”, 2nd Edition, Pearson Education, 2004.

EC1254 – LINEAR INTEGRATED CIRCUITS

L	T	P	C
3	0	0	3

UNIT I IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR IC's 9

Current mirror and current sources, current sources as active loads – Voltage sources – Voltage references – BJT differential amplifier with active loads – General operational amplifier stages – Internal circuit diagrams of IC 741 – DC and AC performance characteristics – Slew rate – Open and closed loop configurations.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Sign changer, scale changer, phase shift circuits – Voltage follower – V-to-I and I-to-V converters – Adder – Subtractor – Instrumentation amplifier – Integrator – Differentiator – Logarithmic amplifier – Antilogarithmic amplifier – Comparators – Schmitt trigger – Precision rectifier – Peak detector – Clipper and clamper – Low-pass – High-pass and band-pass butterworth filters.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analog multiplier using emitter coupled transistor pair – Gilbert multiplier cell – Variable transconductance technique – Analog multiplier IC's and their applications – Operation of the basic PLL – Closed loop analysis – Voltage controlled oscillator – Monolithic PLL IC 565 – Application of PLL for AM detection – FM detection – FSK modulation – demodulation and frequency synthesizing.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS 8

Analog and digital data conversions – D/A converter – Specifications – Weighted resistor type – R-2R ladder type – Voltage mode and current-mode R-2R ladder types – Switches for D/A converters – High speed sample-and-hold circuits – A/D converters – Specifications – Flash type – Successive approximation type – Single slope type – Dual slope type – A/D converter using voltage-to-time conversion – Over-sampling A/D converters.

UNIT V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICs 9

Sine-wave generators – Multivibrators and triangular wave generator – Saw-tooth wave generator – ICL8038 function generator – Timer IC 555 – IC voltage regulators – Three terminal fixed and adjustable voltage regulators – IC 723 general purpose regulator – Monolithic switching regulator – Switched capacitor filter IC MF10 – Frequency to voltage and voltage to frequency converters – Audio power amplifier – Video amplifier – Isolation amplifier – Opto-couplers and Fibre optic IC.

Total : 45

TEXT BOOKS

1. Sergio Franco., “Design with Operational Amplifiers and Analog Integrated Circuits", 3rd Edition, TMH, 2007.
2. Roy Choudhry, D., and Shail Jain, “Linear Integrated Circuits”, 2nd Edition, New Age International Pvt. Ltd, 2000.

REFERENCES

1. Sonde, B. S., “System Design using Integrated Circuits”, 2nd Edition, New Age Pub, 2001.
2. Gray and Meyer., “Analysis and Design of Analog Integrated Circuits”, 4th Edition, Wiley International, 2005.
3. Ramakant A. Gayakwad., “OP-AMP and Linear ICs”, 4th Edition, Prentice Hall / Pearson Education, 2001.
4. Michael Jacob, J., “Applications and Design with Analog Integrated Circuits”, 5th Edition, PHI, 1996.

EE1256 – CONTROL SYSTEMS

L	T	P	C
3	0	0	3

UNIT I CONTROL SYSTEM MODELING 9

Basic elements of control system – Open loop and closed loop systems – Differential equation – Transfer function – Modeling of electric systems – Translational and rotational mechanical systems – Block diagram reduction techniques – Signal flow graph.

UNIT II TIME RESPONSE ANALYSIS 9

Time response analysis – First order systems – Impulse and step response analysis of second order systems – Steady state errors – P, PI, PD and PID compensation – Analysis using MATLAB.

UNIT III FREQUENCY RESPONSE ANALYSIS 9

Frequency response – Bode plot – Polar plot – Nyquist plot – Frequency domain specifications from the plots – Constant M and N circles – Nichol's chart – Use of Nichol's chart in control system analysis – Series – Parallel – Series-parallel compensators – Lead – Lag – Lead lag compensators – Analysis using MATLAB.

UNIT IV STABILITY ANALYSIS 9

Stability – Routh-hurwitz criterion – Root locus technique – Construction of root locus – Stability – Dominant poles – Application of root locus diagram – Nyquist stability criterion – Relative stability – Analysis using MATLAB.

UNIT V STATE VARIABLE ANALYSIS & DIGITAL CONTROL SYSTEMS 9

State space representation of continuous time systems – State equations – Transfer function from state variable representation – Solutions of the state equations - Concepts of controllability and observability – State space representation for discrete time systems – Sampled data control systems – Sampling theorem – Sample and hold – Open loop and closed loop sampled data systems.

Total : 45

TEXTBOOKS

1. Nagrath, J., and Gopal, M., "Control System Engineering", 5th Edition, New Age International Publishers, 2007.
2. Gopal, M., "Control System Principles and Design", 2nd Edition, TMH, 2002.

REFERENCES

1. Benjamin C. Kuo., "Automatic Control Systems", 7th Edition, PHI, 1995.
2. Schaum's Outline Series., "Feedback and Control Systems", 2nd Edition, TMH, 2007.
3. John J. D'azzo and Constantine H. Houpis., "Linear Control System Analysis and Design", 8th Edition, TMH, Inc., 1995.
4. Richard C. Dorf, and Robert H. Bishop., "Modern Control Systems", 2nd Edition, Addison Wesley, 1999.

EC1255 – ELECTRONIC CIRCUITS II AND SIMULATION LABORATORY

L	T	P	C
0	0	3	2

DESIGN OF THE FOLLOWING CIRCUITS

1. Series and shunt feedback amplifiers:
   Frequency response, input and output impedance calculation
2. RC phase shift oscillator, wien bridge oscillator
3. Hartley oscillator, colpitts oscillator
4. Tuned class C amplifier
5. Integrators, Differentiators, Clippers and Clampers
6. Astable, Monostable and Bistable multivibrators

SIMULATION USING PSPICE

1. Differential amplifier
2. Active filters : Butterworth 2^{nd} order LPF, HPF (magnitude & phase response)
3. Astable, Monostable and Bistable multivibrator - transistor bias
4. D/A and A/D converters (successive approximation)
5. Analog multiplier
6. CMOS inverter, NAND and NOR

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	PSPICE with 5 user License	1
2.	CRO (30/6- MHz)	5
3	Function Generator 1 MHz	3
4	Regulated Power supply (0- 30V)	6
5	PCs, printers, bread boards and other consumables as required.	

EC1256 – LINEAR INTEGRATED CIRCUITS LABORATORY

L	T	P	C
0	0	3	2

Design and Analysis of

1. Inverting, Non-inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier.
4. Active lowpass, Highpass and Bandpass filters.
5. Astable and Monostable multivibrators and Schmitt trigger using Op-Amp.
6. Phase shift and Wien bridge oscillators using Op-Amp.
7. Astable and Monostable multivibrators using NE555 timer.
8. PLL characteristics and its use as frequency multiplier.
9. DC power supply using LM317 and LM723.
10. Study of SMPS.
11. Simulation of experiments 3, 4, 5, 6 and 7 using PSpice Netlists.

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

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	DC Regulated Power supply	3
2.	CRO (30/60 MHz)	6
3	Dual Power supply(±15V/±12V)	6
4	PSPICE Netlist with 3 user License	1
5	SMPS trainer kit	1
6	Function generator(1 MHz)	6
	With adequate quantity of consumables as mentioned in the syllabus	

EE1257 – ELECTRICAL ENGINEERING AND CONTROL SYSTEMS LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of separately excited and self excited D.C. generator.
2. Load test on DC shunt motor.
3. Swinburne's test and speed control of DC shunt motor.
4. Load test on single phase transformer and open circuit and short circuit test on single phase transformer
5. Regulation of three phase alternator by EMF and MMF methods.
6. Load test on three phase induction motor.
7. No load and blocked rotor tests on Three phase induction motor (Determination of equivalent circuit parameters)
8. Study of D.C. motor and induction motor starters.
9. Digital simulation of linear systems.
10. Stability analysis of linear system using MATLAB.
11. Study the effect of P, PI, PID controllers using MATLAB.
12. Design of lead and lag compensator.
13. Transfer function of separately excited D.C. generator.
14. Transfer function of armature and field controller DC motor.

Total: 45

SEMESTER V

NUMERICAL METHODS

L	T	P	C
3	1	0	4

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9

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

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

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9

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

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

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.

L:45 T:15 Total: 60

TEXT BOOKS

1. Gerald, C. F. and Wheatley, P. O., "Applied Numerical Analysis", 6th Edition, Pearson Education Asia, 2002.
2. Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Numerical Methods", S.Chand Co. Ltd., 2003.

REFERENCES

1. Balagurusamy, E., "Numerical Methods", TMH Pub. Co. Ltd, 1999.
2. Burden, R.L. and Faires, T.D., "Numerical Analysis", 7th Edition, Thomson Asia Pvt. Ltd., 2002.

MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

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”, PHI, 2003.

REFERENCES

1. Joseph J. Carr, “Elements of Electronics Instrumentation and Measurement”, Pearson education, 2003.
2. Alan. S. Morris, “Principles of Measurements and Instrumentation”, 2nd Edition, PHI, 2003.
3. Ernest O. Doebelin, “Measurement Systems – Application and Design”, TMH, 2004.

MICROPROCESSORS AND MICROCONTROLLERS

L	T	P	C
3	0	0	3

UNIT I 8085 MICROPROCESSOR 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 OF 8085 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 MICROPROCESSOR 9

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, PHI, 2000.
2. John Uffenbeck, “The 80x86 Families, Design, Programming and Interfacing”, 3rd Edition, Pearson Education, 2002.
3. Mohammed Ali Mazidi and Janice Gillispie Mazidi, “The 8051 Microcontroller and Embedded Systems”, Pearson Education Asia, 2003.

REFERENCES

1. Ray A.K. and Burchandi K.M., “Intel Microprocessors Architecture Programming and Interfacing”, TMH, 2000
2. Kenneth J. Ayala, “The 8051 Microcontroller Architecture Programming and Application”, 2nd Edition, Penram International Publishers (India), 1996.
3. Rafiquzhman M., “Microprocessors Theory and Applications: Intel and Motorola”, PHI Pvt. Ltd., 2003.

DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

UNIT I FAST FOURIER TRANSFORM 9

Introduction to DFT – Efficient computation of DFT properties of DFT – FFT algorithms – Radix–2 FFT algorithms – Decimation in Time(DIT) – Decimation in Frequency(DIF) algorithms –Use of FFT algorithms in linear filtering and correlation.

UNIT II DIGITAL FILTER DESIGN 9

Amplitude and phase responses of FIR filters – Linear phase filters – Windowing techniques for design of linear phase FIR filters – Rectangular, Hamming, Kaiser Window – Frequency sampling techniques – IIR filters – Magnitude response – Phase response – Group delay – Design of low pass Butterworth filters (low pass) – Bilinear transformation – Pre-warping – 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 buses, advanced addressing modes – Pipelining – Overview of instruction set of TMS320C5X and C54X.

Total: 45

TEXT BOOKS

1. John G. Proakis, Dimtris G. Manolakis, “Digital Signal Processing Principles, Algorithms and Application”, 3rd Edition, PHI, 2000.
2. Venkataramani B. and Bhaskar M., “Digital Signal Processor Architecture, Programming and Application”, TMH, 2002.

REFERENCES

1. Alan V. Oppenheim, Ronald W. Schafer, John R. Back, “Discrete Time Signal Processing”, 2nd Edition , PHI, 2000.
2. Johny R. Johnson, “Introduction to Digital Signal Processing”, PHI, 1984.
3. Mitra S. K, “Digital Signal Processing – A Computer based approach”, TMH, 1998.

TRANSMISSION LINES AND WAVEGUIDES

L	T	P	C
3	0	0	3

UNIT I TRANSMISSION LINE THEORY 9

General solution of 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 – Reflection coefficient – Wavelength and velocity of propagation – Waveform distortion – Distortionless transmission line – The telephone cable – Inductance loading of telephone cables – Input impedance of lossless lines – Reflection on a line not terminated by Z_o – 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 – Quarter wave line and impedance matching – The half-wave line – The circle diagram for the dissipationless line – Smith chart – Application of the smith chart – Conversion from impedance to reflection co-efficient and vice-versa – Impedance to admittance conversion and vice-versa – 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 – Characteristics 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 waveguide – Wave impedance – 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 TE_{101} mode.

Total: 45

TEXT BOOKS

1. Ryder J. D., “Networks, Lines and Fields”, PHI, 2003.
2. Jordan E. C. and Balmain K. G., “Electro Magnetic Waves and Radiating System”, PHI, 2003.

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, 1997.
3. David K. Cheng, “Field and Waves in Electromagnetism”, Pearson Education, 1989.

ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P	C
3	0	0	3

UNIT I IMPORTANCE OF ENVIRONMENTAL STUDIES 9

Definition – Scope and importance – Need for public awareness – Forest resources – Water resources – Mineral resources – Land resources – Energy resources – Food resources – Equitable use of resources for sustainable lifestyles.

UNIT II ECOSYSTEMS AND BIO DIVERSITY 9

Concept of ecosystem – Structure and function of an ecosystem – Energy flow in the ecosystem – Food chains – Food webs – Ecological pyramids – Definition of bio-diversity – Bio-geographical classification in India – Value of bio-diversity – Bio-diversity at Global, National and local levels – India as a mega diversity nation – Hot spots of bio-diversity – Threats to bio-diversity – Conservation of bio-diversity

UNIT III ENVIRONMENTAL POLLUTION 9

Definition – Causes and effects of environmental pollution – Air pollution – Water pollution – Soil pollution – Marine pollution – Noise pollution – Thermal pollution – Nuclear hazards – Solid waste management – Societal role in pollution prevention – Environmental disasters and management.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 9

Unsustainable to sustainable development – Concept of conservation – Water and energy conservation – Rain water harvesting – Climate change – Global warning – Acid rain – Ozone layer depletion – Nuclear accidents and holocaust – Environmental protection act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 9

Population growth – Population explosion – Family welfare programme – Environment and Human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of IT in environment and human health

Total: 45

TEXT BOOKS

1. Gilbert M. Masters, “Introduction to Environmental Engineering and Science”, 2nd Edition, Pearson Education, 2004.
2. Miller T.G. Jr., “Environmental Science Working With the Earth”, Thomson Learning, 2004.
3. Trivedi R. K. and Goel P.K., “Introduction to Air Pollution”, Techno-Science Publications, 1998.

REFERENCES

1. Bharucha Erach, “The Biodiversity of India”, Mapin Publishing, Ahmedabad, 2003.
2. Trivedi R.K., “Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards”, Vol. I and II Environ Media, 2007.
3. Cunningham W. P. Copper, Gorhani T.H., “Environmental Encyclopaedia”, Jaico Pub, 2001.

MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. Programs for 8/16-bit arithmetic operations (using 8085).
2. Programs for sorting and searching operations (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 microprocessor kits using Mode 1 and Mode 2 of 8255.
7. Interfacing and programming 8279, 8259, and 8253.
8. Serial communication between two microprocessor 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 8051 microcontroller.
11. Programming and verifying timer, interrupts and UART operations in 8031 microcontroller.
12. Communication between 8051 microcontroller kit and PC.

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	8085 KIT	3
2.	8086 KIT	3
3.	8051/8031 KIT	3
4.	8255 Interfacing boards	2 No.s each
5.	8251 Interfacing boards	
6.	8253 Interfacing boards	
7.	8259 Interfacing boards	
8.	8279 Interfacing boards	
9.	Stepper motor Interfacing boards	
10.	DC motor Interfacing boards	
11.	PC (with Required Assembler)	2

DIGITAL SIGNAL PROCESSING LABORATORY

L	T	P	C
0	0	3	2

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

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	MATLAB with 5 User License	1
2.	TMS 320 C 5X Trainer Kit	3
3.	Cathode Ray Oscilloscope	3
4.	Function Generator (1 MHzRange)	2
5	With adequate number of PC's and Printers	

COMMUNICATION AND SOFT SKILLS LABORATORY

L	T	P	C
1	0	3	2

(Common to All Branches of III Year B.E./ B.Tech students of Anna University Tiruchirappalli and affiliated colleges)

The aim of the course is two-fold: to enable the students to develop communication skills in the language laboratory and to arrange discussions for developing soft skills in the lab and/or the classroom. Each lab session shall last for three periods.

List of activities that are to be carried out: (15 sessions x 3 periods = 45)

Lab session # 1: Listening and speaking practice exercises with communicative functions. Learning material: the ACD of spoken English: A foundation course for speakers of Indian Languages (Orient Longman, 2008)

Lab session # 2: Practice with more advanced communicative functions. Learning material: the ACD of spoken English: A foundation course for Speakers of Indian Languages (Orient Longman, 2008)

Lab session # 3: Pronunciation exercises with Oxford Advanced Learners' dictionary of current English or any other standard dictionary

Lab session # 4: Making an oral presentation in English. Learning Material: Professional presentations VCD (Cambridge University Press)

Lab session # 5: Listening to telephone conversations in English and completing the tasks. Learning material: Essential telephoning in English ACD (Cambridge University Press)

Lab session # 6: Giving an exposure to and practice with model group discussion and interviews. Learning material: How to prepare for group discussion and interview audio cassette (McGraw-Hill)

Lab session # 7: Giving insights into the format and the task types in the IELTS (International English Language Testing System). Learning material: Objective IELTS, Intermediate Level (CUP)

Lab session # 8: Understanding the format and the task types in the TOEFL (Test of English as a Foreign Language). Learning material: Understanding the TOEFL (Educational Testing Services, Princeton)

Lab session # 9: Administering the BEC (Business English Certificate) diagnostic test. Learning material: BEC practice materials (British Council, Chennai)

Lab session # 10: Completing the steps involved in career, Life planning and change management. Learning material: Developing soft skills (Pearson Education)

Lab session # 11: Setting goals and objectives exercises. Learning Material: Developing soft skills (Pearson Education)

Lab session # 12: Prioritizing and time planning exercises. Learning Material: Managing time multimedia program CD

Lab session # 13: Taking a personality typing/ psychometric test. Learning material: 200 psychometric test prepared by the CUIC, Anna University Chennai

Lab session # 14: Critical and creative thinking exercises.

Lab session # 15: Improving body language and cross-cultural communication with pictures. Learning material: Body language (S. Chand and Co.)

For a detailed plan, refer to the topics given below;

UNIT I LISTENING AND SPEAKING PRACTICE IN COMMUNICATIVE FUNCTIONS

Introductions and meetings – Talking about studies and/or job – Expressing likes and dislikes – Describing daily routines and current activities – Talking about past states and events – Talking about future plans and intentions – Expressing preferences – Giving reasons – Expressing opinions, agreement and disagreement – Seeking and giving advice – Making suggestions.

UNIT II SPEAKING APPLICATIONS

Making an oral presentation – Preparing the presentation – Performing the presentation – Beginning – Language – Visual aids and body language – Voice – Ending – Questions – Telephone conversations – Group discussion and interview.

UNIT III UNDERSTANDING AND PREPARING FOR INTERNATIONAL ENGLISH LANGUAGE EXAMINATIONS

International English Language Testing System (IELTS) – Test of English as a Foreign Language (TOEFL) – Business English Certificate (BEC)

UNIT IV SOFT SKILLS (1)

Preparing for and dealing with change – Motivation, goal-setting and self-esteem – Managing time and stress – Career and life planning – Team work – Leadership traits.

UNIT V SOFT SKILLS (2)

Multiple intelligences – Learning styles and personality typing – Critical and creative thinking – People, cultures and self-intercultural communication.

RESOURCES

1. Kamalesh Sadanand and Susheela Punitha, "Spoken English**:** A Foundation Course" for Speakers of Indian Languages, Part 2 Audio CD, Hyderabad: Orient Longman, 2008
2. Malcome Goodale, "Professional Presentations", (VCD) New Delhi: Cambridge University Press, 2005
3. Barbara Garside and Tony Garside, "Essential Telephoning in English (Audio CD**)",** Cambridge: Cambridge University Press, 2002
4. Hari Mohan Prasad and Rajnish Mohan, "How to Prepare for Group Discussion and Interview **(**Audio Cassette)", Tata McGraw-Hill Publishing
5. International English Language Testing System Practice Tests, CUP
6. Business English Certificate Materials, Cambridge University Press
7. Understanding the TOEFL**.** Educational Testing Services, Princeton, US
8. Interactive Multimedia Programs on Managing Time and Stress
9. Robert M. Sherfield and et al "Developing Soft Skills", 4th Edition, Pearson Education, 2009.

Total: 60

SEMESTER VI

DIGITAL COMMUNICATION TECHNIQUES

L	T	P	C
3	0	0	3

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 – Inter-symbol interference – Nyquist's criterion for distortionless base band binary transmission – Correlative level coding – Baseband 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.

Total: 45

TEXT BOOK

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

REFERENCES

1. John G. Proakis, "Digital Communication", 3rd Edition, TMH, 1995
2. Taub and Schilling, "Principles of Digital Communication", 28th reprint, TMH, 2003

COMPUTER NETWORKS

L	T	P	C
3	0	0	3

UNIT I DATA COMMUNICATION 8

Components and categories – Types of connections – Topologies – Protocols and standards – ISO / OSI model – Transmission media – Line coding – Modems – RS232 interfacing sequences.

UNIT II DATA 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

Routers – Internet working – Packet switching and datagram approach – IP addressing methods – Sub netting – Routing – Distance vector routing – Link state routing.

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 – FTP – HTTP – WWW – Security – Cryptography.

Total:45

TEXT BOOK

1. Behrouz A. Foruzan, “Data communication and Networking”, TMH, 2004.

REFERENCES

1. Larry L. Peterson and Peter S. Davie, “COMPUTER NETWORKS”, 2nd Edition, Harcourt Asia Pvt. Ltd., 1996.
2. Andrew S. Tannenbaum, “Computer Networks”, 4th Edition, PHI, 2003.
3. William Stallings, “Data and Computer Communication”, 6th Edition, Pearson Education, 2000.
4. James F. Kurouse and Rouse W, “Computer Networking: A Topdown Approach Featuring”, Pearson Education, 2003.

ANTENNAS AND WAVE PROPAGATION

L	T	P	C
3	1	0	4

UNIT I ANTENNA FUNDAMENTALS 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 wavelength and resultant circular polarization – 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 – End-fire array.

UNIT II 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 III TRAVELLING WAVE (WIDEBAND) ANTENNAS 9

Loop antenna (elementary treatment only) – Helical antenna – Radiation from a traveling wave on a wire – Analysis of rhombic antenna – Design of rhombic antennas – Yagi-Uda antenna – Log periodic antenna.

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 source – 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 – Luxemberg 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.

L:45 T:15 Total: 60

TEXTBOOK

1. John D. Kraus and Ronalatory Marhefka, “Antennas”, TMH Book Company, 2002.

REFERENCES

1. Jordan E. C. and Balmain, “Electro Magnetic Waves and Radiating Systems”, PHI, 1968, Reprint 2003
2. Collins R. E., “Antennas and Radio Propagation”, TMH, 1987.
3. Balanis, “Antenna Theory”, 2nd Edition, John Wiley & Sons, 2003.

COMPUTER ARCHITECTURE

L	T	P	C
3	1	0	4

UNIT I BASIC STRUCTURE OF COMPUTERS 10

Functional units – Basic operational concepts, bus structures, software performance – Memory locations and 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 – Micro programmed 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 RAM, ROM – 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, and USB).

L:45 T:15 Total: 60

TEXT BOOK

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky., "Computer Organization" 5th Edition, TMH, 2002.

REFERENCES

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

VLSI DESIGN

L	T	P	C
3	0	0	3

UNIT I MOS TRANSISTOR THEORY AND PROCESS TECHNOLOGY 9

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

UNIT II INVERTERS AND LOGIC GATES 9

NMOS and CMOS inverters – Stick diagram – Inverter ratio – DC and transient characteristics – Switching times – Super buffers – Driving large capacitance loads – CMOS logic structures – Transmission gates – Static CMOS design – Dynamic CMOS design

UNIT III CIRCUIT CHARACTERISATION AND PERFORMANCE ESTIMATION 9

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

UNIT IV VLSI SYSTEM COMPONENTS CIRCUITS AND SYSTEM LEVEL PHYSICAL DESIGN 9

Multiplexers – Decoders – Comparators – Priority encoders – Shift registers – Arithmetic circuits – Ripple carry adders – Carry look ahead adders – High-speed adders – Multipliers – Physical design – Delay modeling – Cross talk – Floor planning – Power distribution – Clock distribution – Basics of CMOS testing

UNITV VERILOG HARDWARE DESCRIPTION LANGUAGE 9

Overview of digital design with Verilog HDL – Hierarchical modeling concepts– Modules and port definitions – Gate level modeling– Data flow modeling – Behavioral modeling – Task & functions – Test bench

Total: 45

TEXT BOOKS

1. Neil H. E. Weste and Kamran Eshraghian, “Principles of CMOS VLSI Design”, 2nd edition, Pearson Education Asia, 2000.
2. John P. Uyemura, “Introduction to VLSI Circuits and Systems”, John Wiley and Sons, Inc., 2002.
3. Samir Palnitkar, “Verilog HDL”, 2nd Edition,Pearson Education, 2004.

REFERENCES

1. Eugene D. Fabricius, “Introduction to VLSI Design”, TMH International Editions, 1990.
2. Bhasker J., “A Verilog HDL Primer”, 2nd Edition, B. S. Publications, 2001.
3. Pucknell, “Basic VLSI Design”, Prentice Hall of India Publication, 1995.
4. Wayne Wolf, “Modern VLSI Design System on chip”, Pearson Education, 2002.

DIGITAL COMMUNICATION LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

a) Antennas Laboratory

1 Radiation pattern of half-wave dipole antenna
2. Radiation pattern of yagi-uda antenna
3. Radiation pattern of loop antenna

b) Analog and Digital Communication Laboratory

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

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Antenna trainer kits That consists of Half wave Dipole antenna,Yagi Antenna and Loop Antenna	2 sets
2.	Analog and Digital Communication Trainer kit (To Perform required modulation as per the syllabus)	3 No.s
3	Analog and Digital communication trainer kitwith line coding and decoding facility	1 No.
4	Cathode Ray Oscilloscope	6 Nos
5	With adequate number of bread boards consumables and other measuring instruments	

NETWORKS LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMETS

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 through 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 reject 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 programing

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	LAN trainer Kits	4
2.	Wireless LAN trainer kits	2
3	PCs , accessories (HW/SW) and consumables as required .	

VLSI DESIGN LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

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 FPGA 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 and testing on board LED's 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).

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	FPGA trainer kits	6
2.	HDL tools(Full version) with 6 USER License	1
3	Traffic light controller interface kits	1
4	Real time clock interface kits	1
	PC s , accessories (HW and SW) and consumables as required	

SEMESTER VII

EMBEDDED SYSTEMS

L	T	P	C
3	0	0	3

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 System (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 synchronization – 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 (RPC).

UNIT V REAL TIME OPERATING SYSTEMS –PART – 2 9

Study of micro C/OS–II or Vs 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. Wayne Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Morgan Kaufman Publishers, First Indian Reprint, 2001.
2. Rajkamal, “Embedded Systems Architecture, Programming and Design”, TMH, First reprint, 2003.

REFERENCES

1. Steve Heath, “Embedded Systems Design”, 2nd Edition, 2003.
2. David E. Simon, “An Embedded Software Primer”, Pearson Education, First Indian Reprint 2000.
3. Frank Vahid and Tony Givargis, “Embedded Systems Design –A unified Hardware /Software Introduction”, John Wiley, 2002

OPTICAL COMMUNICATION AND NETWORKS

L	T	P	C
3	0	0	3

UNIT I OPTICAL NETWORKING COMPONENTS 9

First and second generation optical networks – Components – Couplers – Isolators – circulators – Multiplexers – Filters – Amplifiers – Switches and wavelength converters

UNIT II SONET AND SDH NETWORKS 9

Integration of TDM signals – Layers – Framing – Transport overhead – Alarms – multiplexing – Network elements – Topologies – Protection architectures – Ring architectures – Network management

UNIT III BROADCAST AND SELECT NETWORKS 9

Topologies – Single-hop – Multi-hop – and Shufflenet multi-hop network – Media – Access control protocols – Test beds.

UNIT IV WAVELENGTH ROUTING NETWORKS 9

Node design – Issues in network design and operation – Optical layer cost tradeoffs – Routing and wavelength assignment – Wavelength routing test beds

UNIT V HIGH CAPACITY NETWORKS 9

SDM – TDM and WDM approaches – Application areas – Optical TDM networks – Multiplexing and demultiplexing – Synchronization – Broadcast networks – Switch based networks – OTDM test beds

Total: 45

TEXT BOOKS

1. Rajiv, Ramaswami and Kumar Sivarajan, “Optical Networks: A practical perspective”, 2nd Edition, Morgan Kaufmann, 2001.
2. Keiser G., “Optical fiber communication systems”, McGraw-Hill, 2000.

REFERENCES

1. Vivek Alwayn, “Optical Network Design and Implementation”, Pearson Education, 2004.
2. Hussein T. Mouftab and Pin-Han Ho, “Optical Networks: Architecture and Survivability”, Kluwer Academic Publishers, 2002.

MICROWAVE ENGINEERING

L	T	P	C
3	1	0	4

UNIT I MICROWAVE NETWORK THEORY 7

Introduction – Symmetrical Z and Y matrices for reciprocal network – Scattering matrix representation of multi port network properties of S-parameters – S matrix of a two port network with mismatched load – Comparison between [S] - [Z] and [Y] matrices – Relationship between Y-Z and ABCD parameters with S parameters – Numerical problems.

UNIT II MICROWAVE PASSIVE DEVICES 10

Coaxial connectors and adapters – Wave guide choke flanges – Matched terminations – Short circuit plunger – Rectangular to circular wave guide transition – Tuning screws – Wave guide corners – Bends and twists – Windows – Coaxial line to wave guide adapters – Coupling loops and coupling aperture – Attenuators – Phase shifters – Wave guide tees – E plane tee – H plane tee – Magic tee and their applications – Isolators – Circulators – Directional couplers – Scattering matrix derivation for all components – Numerical problems.

UNIT III MICROWAVE VACCUM TUBE DEVICES 10

Introduction – Two cavity klystron amplifier – Mechanism and mode of operation – Power output and efficiency – Mode curve – Equivalent circuit and voltage gain – Beam loading – Applications – Reflex klystron oscillator – Mechanism and mode of operation Power output – Efficiency – Mode curve – Equivalent circuit – Electronic admittance – Modulation of reflex klystron – Applications – TWT amplifier – Principle of operation gain and applications – Magnetron oscillator – Hull cut-off voltage mechanism of operation – Mode separation – Phase focusing – Power output and efficiency – Applications – Numerical problems.

UNIT IV MICROWAVE SOLID STATE DEVICES AND CIRCUITS 9

Microwave diodes – Crystal diode – Schottky diode – Harmonic mixer – PIN diode – Operation switches – Phase switches and attenuators – Gunn diode – Mode of operation – Oscillator circuit – IMPATT diodes – Mechanism of operation – Application as oscillator and amplifier – Tunnel diodes oscillator / amplifiers – Varactor diode – VCO – Parametric amplifier – Microwave transistors – Unipolar and bipolar – Applications – Numerical problems.

UNIT V MICROWAVE MEASUREMENTS 9

Introduction – Tunable detector – Slotted line carriage – VSWR meter – Spectrum analyzer – Network analyzer – Power measurements – Schottky barrier diode sensor – Bolometer sensor – Power sensor – High power measurement – Insertion loss and attenuation measurement – VSWR measurement – Low and high VSWR – Impedance measurement – Frequency measurement – Measurement of cavity Q – Dielectric measurement of a solid by wave-guide method – Antenna measurement – Radiation pattern – Phase and gain.

L: 45 T: 15 Total: 60

TEXT BOOK

1. Annapurna Das, Sisir K. Das, “Microwave Engineering”, TMH Co., Ltd., 1999. Reprint 2001.

REFERENCES

1. Collin R.E., “Foundation of Microwave Engineering”, 2nd Edition, TMH, 1992.
2. Samuel Y. Liao, “Microwave devices and Circuits”, PHI Pvt Ltd., 1995.
3. Reich J.H. et al, “Microwave”, East West Press, 1978.

SATELLITE COMMUNICATION

L	T	P	C
3	0	0	3

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 non-spherical 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 AND SPACE SEGMENT 9

Introduction – Antenna look angles – 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 – Wide band receiver – Input demultiplexer – Power amplifier – Antenna subsystem – Morelos-anik – E-advanced tiros – N spacecraft

UNIT III EARTH SEGMENT AND 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 – Inter modulation noise.

UNIT IV SATELLITE ACCESS 9

Single access – Preassigned FDMA, Demand assigned FDMA, SPADE system. bandwidth – Limited power – Limited TWT amplifier operation, FDMA downlink analysis.

TDMA: Reference burst – Preamble and post amble – 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 – Calculation of uplink power requirements for FDMA and 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 tracking – Spectrum spreading and despreading – 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 – Direct broadcast satellite services.

UNIT V GEOGRAPHIC INFORMATION SYSTEM 9

GIS – Components of GIS – Hardware, software and organisational context – Data – Spatial and Non-spatial – Maps – Types of maps –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 – Urban applications – Application of remote sensing and GIS – Water resources – Urban analysis – Watershed management – Resources information systems. Global Positioning System (GPS) – An introduction.

Total: 45

TEXT BOOKS

1. Dennis Roddy, "Satellite Communications", 3rd Edition, TMH Publication, 2001
2. Anji Reddy, "Remote Sensing and Geographical Information Systems", BS Publications, 2001.

REFERENCES

1. Timothy Pratt, Charles Bostian and Jeremy Allmuti, "Satellite Communications", John Willy and Sons (Asia) Pvt. Ltd. 2004
2. Wilbur L. Pritchars, Henri G. Suyder Hond and Robert A. Nelson, "Satellite Communication Systems Engineering", 2nd Edition, Pearson Education Ltd., 2003.
3. Richharia M., "Satellite Communication Systems Design Principles", 2nd Edition, Macmillan Press Ltd, 2003.
4. Kang Tsung Chang, "Introduction to Geograhic Information Systems", TMH, 2002

EMBEDDED SYSTEMS LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

- Open source software such as linux flavors will be used. Ability to use industry standard tools for verification and validation
- High level language programming (C, C++) and porting it on a processor
- Create FSM of a typical application and implement on an FPGA
- Application development, download partition between FPGA and ARM on performance characteristics
- Application development. Hardware and software partitioning
- Projects (implementation of a wireless communication protocol on an embedded system).

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Embedded trainer kits with ARM board	3
2.	Embedded trainer kits suitable for wireless communication	3
3	With adequate quantities of Hardware, software and consumables	

OPTICAL AND MICROWAVE LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

Experiments pertaining to Fiber optics and Optical Communication:

1. Numerical aperture determination for fibers and attenuation measurement in fibers.
2. Mode characteristics of fibers – SM fibers.
3. Coupling fibers to semi-conductor sources – connectors and splices.
4. Fiber optic communication links.
5. LED and photo-diode characteristics.

Microwave experiments:

1. VSWR measurements – Determination of terminated impedance
2. Determination of guide wavelength, frequency measurement.
3. Microwave power measurement (using DC and H-arm, E-arm of a magic T).
4. Characteristics of Gunn diode oscillator.

Total: 45

OPTICAL AND MICROWAVE LABORATORY

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Microwave test bench with klystron source consisting of (i)Klystron power supply (ii) Klystron table with mount (iii) Isolator (iv) Variable attenuator (v)Direct read out frequency meter(vi) Slotted line section with tunable probe detector (vii) Detector mount (viii) Slide screw tuner	3 No.s
2.	Microwave test bench with Gunn source consisting of following components (i) Gunn power supply (ii) Gunn oscillator (iii) PIN Modulator (iv)Isolator (v)Variable attenuator (vi) Direct read out frequency meter (vii) Slotted line section with tunable probe detector (viii) Detector mount (ix) Slide screw tuner	1 No.
3	Microwave power meter	1
4	VSWR meter	3
5	Matched termination	3
6	Movable short	3
7	Fixed short	1
8	Horn Antenna	2
9	E- Plane, H- Plane and Magic Tees	2
10	Directional coupler	2
11	CRO (60 MHz)	8 Nos
12	Fiber optic Trainer	1
13	Fiber optic Trainer kit with digital link capability	2
14	Splicing kit	1
15	Mode characteristics of Fiber optic trainer kit	1
16	Optical Power meter	1
17	Voltmeter (0 – 10V),Ammeter(0- 30 mA) and (0-100mA)	Each 1 No.
	With adequate quantities of measuring instruments.	

ELECTRONIC SYSTEM DESIGN LABORATORY

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

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 4-20mA 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 and 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 data 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 using PLL NE 565.

8. Microcontroller based system design

   Design of microcontroller based system for simple applications like security systems combination lock etc. Using flash micro controller.

9. DSP based system design

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

Total: 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Buck boost converter kit	1
2.	Fly back converter kit	1
3	Process control trainer kit	1
4	Wireless Data Modem	1
5	Microcontroller kit with application module	Minimum 1 no. each
6	TMS 320 DSP kit with application module	Minimum 1 no. each
7	Auto transformer	Single phase, 300 V
	With adequate quantity of consumables, IC s and transformers etc.,	

TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

UNIT I 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.

UNIT II 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.

UNIT III 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.

UNIT IV 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.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000 and other quality systems – ISO 9000:2000 quality systems – 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., ISBN 81–297–0260–6, 2003 (Indian reprint 2004).

REFERENCES

1. James R. Evans and 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”, TMH, 1991.
3. Oakland J.S., “Total Quality Management” Butterworth-Hcinemann Ltd., 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.

MOBILE AND WIRELESS COMMUNICATION

L	T	P	C
3	1	0	4

UNIT I PRINCIPLES OF WIRELESS COMMUNICATION 10

Digital modulation techniques – Linear modulation techniques – Spread spectrum modulation – Performance of modulation – Multiple access techniques – TDMA – FDMA – CDMA – SDMA – Overview of cellular networks – Cellular concept – Handoff strategies – Path loss – Fading and Doppler effect.

UNIT II WIRELESS PROTOCOLS 11

Issues and challenges of wireless networks – Location management – Resource management – Routing – Power management – Security – Wireless media access techniques – ALOHA – CSMA – Wireless LAN – MAN – IEEE 802.11 (a–b–e–f–g–h–i) – Bluetooth. Wireless routing protocols – Mobile IP – IPv4 – IPv6 – Wireless TCP. Protocols for 3G & 4G cellular networks – IMT – 2000 – UMTS – CDMA2000 – Mobility management and handover technologies – All-IP based cellular network

UNIT III TYPES OF WIRELESS NETWORKS 9

Mobile networks – Ad-hoc networks – Ad-hoc routing – Sensor networks – Peer-Peer networks – Mobile routing protocols – DSR – AODV – Reactive routing – Location aided routing – Mobility models – Entity based – Group mobility – Random way – Point mobility model.

UNIT IV ISSUES AND CHALLENGES 9

Issues and challenges of mobile networks – Security issues – Authentication in mobile applications – Privacy issues – Power management – Energy awareness computing. Mobile IP and Ad-hoc networks – VoIP applications.

UNIT V SIMULATION 6

Study of various network simulators (GloMoSim – NS2 – Opnet) – Designing and evaluating the performance of various transport and routing protocols of mobile and wireless networks using network simulator (any one).

Total: 60

REFERENCES

1. Theodore S. Rappaport, “Wireless Communications, Principles and Practice”, Prentice Hall, 1996.
2. Stallings W., “Wireless Communications & Networks”, Prentice Hall, 2001.
3. Schiller J., “Mobile Communications”, Addison Wesley, 2000.
4. Lee W. C. Y., “Mobile Communications Engineering: Theory and Applications”, 2nd Edition, TMH, 1997.
5. Pahlavan K. and Krishnamurthy P., “Principles of Wireless Networks”, Prentice Hall, 2002.
6. Black U. D., “Mobile and Wireless Networks”, PHI, 1996.
7. Charles E. Perkins, “Ad – Hoc Networking”, Addison – Wesley, December 2000
8. IEEE Journals and Proceedings

ELECTIVES ODD SEMESTER

MEDICAL ELECTRONICS

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3	0	0	3

UNIT I ELECTRO– PHYSIOLOGY AND BIO– POTENTIAL RECORDING 9

The origin of bio-potentials – Bio-potential 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

Thermo graph – Endoscopy unit – Laser in medicine – Diathermy units – Electrical safety in medical equipment.

Total: 45

TEXTBOOK

1. Leislie Cromwell, “Biomedical Instrumentation and Measurement”, PHI, 2002.

REFERENCES

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

SPEECH PROCESSING

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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. Rabiner L.R. and Schafer R.E, “Digital Processing of Speech Signals”, Prentice Hall, 1978.

REFERENCES

1. Flanagan J.L, “Speech Analysis Synthesis and Perception”, 2nd Edition, Springer Vertag, 1972.
2. Witten I.H., “Principles of Computer Speech”, Academic Press, 1983.

ADVANCED MICROPROCESSORS

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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 IV 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 – ARM processors – ARM registers – ARM instructions – ARM built-in shift mechanism – ARM branch instructions – Sequence control – Data movement and memory reference instructions.

Total: 45

TEXT BOOKS

1. 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”, PHI Private Limited, 2003.
2. John Peatman, “Design with Microcontroller”, TMH Publishing Co Ltd, 2003.
3. Alan Clements, “The Principles of Computer Hardware”, 3rd Edition, Oxford University Press, 2003.

REFERENCES

1. Rajkamal, “The Concepts and Feature of Micro Controllers 68HC11, 8051 and 8096”, S Chand Publishers, 2000.

ADVANCED DIGITAL SIGNAL PROCESSING

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UNIT I PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION 9

Relationship between auto correlation and model parameters – Yule – Walker method for the AR model parameters – Burg method for the AR model parameters – Unconstrained least – Squares method for the AR model parameters – Sequential estimation methods for 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 – 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. Monson H. Hayes, “Statistical Digital Signal Processing and Modeling”, Wiley, 2002.
2. John G. Proakis and Dimitris G. Manobakis, “Digital Signal Processing Principles, Algorithms and Applications”, 3rd Edition, PHI, 2000.

REFERENCES

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

ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

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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 technique 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 conversion.

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 and Co, 2000.
2. Clayton R. Paul, “Introduction to Electromagnetic Compatibility” , Wiley and sons ,1992

REFERENCES

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

POWER ELECTRONICS

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UNIT I POWER ELECTRONICS DEVICES 9

Characteristics of power devices – Characteristics of SCR – Diac – Triac – SCS – GTO – PUT – Power transistors – Power FET 's – 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 SCR's.

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 Edition, PHI, 2004.
2. Singh and Kanchandani, "Power Electronics", TMH, 1998.

REFERENCES

1. Sen P.C., "Power Electronics", TMH, 1987.
2. Dubey, "Thyristorised Power Controllers", Wiley Eastern 1986.
3. Vithayathil, "Power Electronics – Principles and Applications", TMH, 1995.
4. Lander, "Power Electronics", 3rd Edition, TMH, 1994.

TELEVISION AND VIDEO ENGINEERING

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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 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 amplifier 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 – 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 – Decolour 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 mixing – 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 – Stereo sound in TV – 3D-TV – EDTV – Digital equipments for TV studios.

Total: 45

TEXT BOOKS

1. Gulati R.R., “Monochrome Television Practice, Principles, Technology and Servicing” , 2nd Edition, New Age International Publishes, 2004.
2. Gulati R.R., “Monochrome And Colour Television”, New Age Internationl Publisher, 2003.

REFERENCES

1. Dhake A.M., “Television and Video Engineering”, 2nd Edition, TMH, 2003.
2. Bali S.P., “ Colour Television, Theory and Practice”, TMH, 1994

PROFESSIONAL ETHICS AND HUMAN VALUES

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UNIT I 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

UNIT II 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.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation – Engineers as responsible experimenters – Codes of ethics – A balanced outlook on law – The challenger case study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk – Assessment of safety and risk – Risk benefit analysis and 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.

UNIT V 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", TMH, 1996.
2. Govindarajan M, Natarajan S and Senthil Kumar V. S., "Engineering Ethics", Prentice Hall of India, 2004.

REFERENCES

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

OPERATING SYSTEMS

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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 – Co-operating 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”, 6th Edition, John Wiley and Sons (ASIA) Pvt. LTD, 2003.

REFERENCES

1. Harvey M. Deitel, “Operating Systems”, 2nd Edition, Pearson Education Pvt. Ltd, 2002.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, PHI Pvt. Ltd, 2003.
3. William Stallings, “Operating System”, 4th Edition, PHI, 2003.

INTERNET AND JAVA PROGRAMMING

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UNIT I INTERNETWORKING WITH TCP / IP 9

Review of network technologies – Internet addressing – Address resolution protocols (ARP / RARP) – Routing IP data grams – 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 – Sub classing 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, PHI, 1999.
2. Eric Ladd and Jim O'Donnell, "Using HTML 4, XML and Java 1.2", Que Platinum Edition, PHI, 1999.
3. William Stallings, “High Speed Networks”, PHI, 1998.

COMPUTER HARDWARE AND INTERFACING

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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 – CD-ROM 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 – Direct – 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", TMH, 2001.

REFERENCES

1. Craig Zacker and John Rourke, "The Complete Reference: PC Hardware", TMH, 2001.
2. Mike Meyers, "Introduction to PC Hardware and Trouble Shooting", TMH, 2003.
3. Govindarajulu B., "IBM PC and Clones Hardware Trouble Shooting and Maintenance", TMH, 2002.

HIGH SPEED NETWORKS

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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 allocation – 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 and characteristics – data flow – RSVP operations – Protocol mechanisms – Multi protocol label switching – Operations – Label stacking – Protocol details – RTP – Protocol architecture – Data transfer protocol – RTCP.

Total: 45

TEXT BOOK

1. Jean warland and Pravin Wadaja, "HIGH PERFORMANCE COMMUNICATION NETWORKS", 2nd Edition, Jean Harcourt Asia Pvt. Ltd., 2001.

REFERENCES

1. William Stallings, "High Speed Networks and Internet", 2nd Edition, Pearson Education, 2002.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "Mpls and Vpn Architecture", Volume 1 and 2, Cisco Press, 2003

EVEN SEMESTER

ADVANCED ELECTRONIC SYSTEM DESIGN

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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 SCR's – Design of crowbar and foldback protection circuits – Switched Mode Power Supplies(SMPS) – Forward – Fly back-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(CAD) of PCB's.

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", PHI, 1990.
3. Walter C. Bosshart, "Printed Circuit Boards – Design and Technology", TMH, 1983.

REFERENCES

1. Keith H. Billings, "Handbook of Switched Mode Supplies", TMH Publishing Co., 1989.
2. Michael Jaacob, "Applications and Design with Analog Integrated Circuits", PHI, 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", PHI, 2004.

OPTO ELECTRONIC DEVICES

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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 Display (LCD) – 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. Wilson J and Haukes J., “Opto Electronics – An Introduction”, PHI Pvt. Ltd., 1995.

REFERENCES

1. Bhattacharya, “Semiconductor Opto Electronic Devices”, PHI Pvt Ltd., 1995.
2. Jasprit Singh, “Opto Electronics – As Introduction to Materials and Devices”, TMH International Edition, 1998.

TELECOMMUNICATION SYSTEM MODELING AND SIMULATION

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UNIT I SIMULATION OF RANDOM VARIABLES RANDOM PROCESS 9

Generation of random numbers and sequence – Gaussian 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 – Multi path 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. Jeruchim M.C, Balaban P and Sam K. Shanmugam, “Simulation of Communication Systems: Modeling, Methodology and Techniques”, Plenum Press, 2001.

REFERENCES

1. Averill M. Law and David Kelton W., “Simulation Modeling and Analysis”, TMH Inc., 2000.
2. Geoffrey Gorden, “System Simulation”, 2nd Edition, PHI, 1992.
3. Turin W., “Performance Analysis of Digital Communication Systems”, Computer Science Press, 1990.
4. Jerry Banks and John S. Carson, “Discrete Event System Simulation”, PHI, 1984.

RADAR AND NAVIGATIONAL AIDS

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UNIT I INTRODUCTION TO RADAR 9

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 MTI AND PULSE DOPPLER RADAR 9

Introduction to Doppler and MTI radar – Delay-line cancellers – Staggered pulse repetition frequencies – Doppler filter banks – Digital MTI processing – Moving target detector – Limitations to MTI performance – MTI from a moving platform (AMIT) – Pulse Doppler radar – Other Doppler radar topics – Tracking with radar – Mono pulse 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 – Detectors – Automatic detector – Integrators – Constant – False – Alarm rate receivers – The radar operator – Signal management – Propagation radar waves – Atmospheric – 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 – Super heterodyne receiver – Duplexers and receiver protectors – Radar displays.

UNIT IV 9

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 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 co-ordinate 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”, 3rd Edition, TMH, 2003

REFERENCES

1. Peyton Z. Peebles, “Radar Principles”, John wiley, 2004
2. Toomay J.C, “Principles of Radar”, 2nd Edition, PHI, 2004

ENGINEERING ACOUSTICS

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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 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 co-efficient

UNIT III PIPE 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 BOOK

1. Lawerence E. Kinsler, Austin R. Frey, Alan B. Coppens and James V. Sanders, "Fundamentals of Acoustics", 4th Edition, Wiley, 2000.

REFERENCE

1. Berarek L., "Acoustics", TMH, 2002.

ROBOTICS

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UNIT I ROBOT ORGANIZATION 9

Coordinate transformation, kinematics and inverse kinematics – Trajectory planning and remote manipulation.

UNIT II ROBOT HARDWARE 9

Robot sensors – Proximity sensors – Range sensors – Visual sensors – Auditory sensors – Robot manipulators – Manipulator dynamics – Manipulator control – Wrists – End efforts – Robot grippers.

UNIT III ROBOT AND ARTIFICIAL INTELLIGENCE 9

Principles of AI – Basics of learning – Planning movement – Basics of knowledge representations – Robot programming languages.

UNIT IV ROBOTIC VISION SYSTEMS 9

Principles of edge detection – Determining optical flow and shape – Image segmentation – Pattern recognition – Model directed scene analysis.

UNIT V ROBOT CONTROL AND APPLICATION 9

Robot control using voice and infrared – Overview of robot applications – Prosthetic devices – Robots in material handling, processing assembly and storage.

Total: 45

REFERENCES

1. Koren, “Robotics for Engineers”, TMH International Company, 1995.
2. Vokopravotic, “Introduction to Robotics”, Springer, 1988.
3. Rathmill K., “Robot Technology and Application”, Springer, 1985.
4. Charniak and Mc Darmott, “Introduction to Artificial Intelligence”, TMH, 1986.
5. Fu K.S, Gonzally R.C, Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, TMH Book Company, 1997.
6. Barry Leatham and Jones, “Elements of Industrial Robotics”, Pittman Publishing, 1987.
7. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G. Odrey, “Industrial Robotic Technology Programming and Applications”, TMH Book Company, 1986.
8. Bernard Hodges and Paul Hallam, “Industrial Robotics”, British Library Cataloguing Publication, 1990.

DIGITAL IMAGE PROCESSING

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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 – Love 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 imager– 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 BOOK

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

REFERENCES

1. William K. Pratt, “Digital Image Processing” , John Willey ,2001
2. Millman Sonka, Vaclav Hlavac, Roger Boyle, Broos/Colic, Thompson Learniy, Vision, “Image Processing Analysis and Machine”, 1999.
3. Jain A.K., “Fundamentals of Digital Image Processing”, PHI, 1995.
4. Chanda Dutta Magundar, “Digital Image Processing and Applications”, PHI, 2000

WIRELESS NETWORKS

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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 BOOK

1. Kaveh Pahlavan, Prashant Krishnamoorthy, “Principles of Wireless Networks, – A United Approach”, Pearson Education, 2002.

REFERENCES

1. Jochen Schiller, “Mobile Communications”, 2nd Edition, Person Education, 2003.
2. Wang X. and Poor H.V., “Wireless Communication Systems”, Pearson Education, 2004.
3. Mallick M., “Mobile and Wireless Design Essentials”, Wiley Publishing Inc. 2003.
4. Nicopolitidis P, Obaidat M.S, Papadimitria G.I, Pomportsis A.S., “Wireless Networks”, John Wiley and Sons, 2003.

NETWORK SECURITY

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UNIT I SYMMETRIC CIPHERS 9

Overview – Classical encryption techniques – Block ciphers and data encryption standard – Finite fields – Advanced encryption standard – Contemporary symmetric ciphers – Confidentiality using symmetric encryption.

UNIT II PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS 9

Number theory – Public-key cryptography and RSA – Keym – Diffie-hellman key exchange – Elliptic curve cryptography – Message authentication and hash functions – Hash algorithms – Digital signatures and authentication protocols.

UNIT III NETWORK SECURITY PRACTICE 9

Authentication applications – Kerberos-X.509 authentication service – Electronic mail security – Pretty good privacy – S/MIME – IP security – IP security architecture – Authentication header – Encapsulating security payload – Key management.

UNIT IV SYSTEM SECURITY 9

Intruders – Intrusion detection – Password management – Malicious software – Firewalls – Firewall design principles – Trusted systems.

UNIT V WIRELESS SECURITY 9

Wireless LAN security standards – Wireless LAN security factors and issues.

Total: 45

TEXT BOOK

1. William Stallings, “Cryptography and Network Security – Principles and Practices”, 3rd Edition, Pearson Education, 2003.

REFERENCES

1. Atul Kahate, “Cryptography and Network Security”, 2nd Edition, TMH, 2007.
2. Bruce Schneier, “Applied Cryptography”, 2nd Edition, John Wiley and Sons Inc, 2001.
3. Stewart S. Miller, “Wi-Fi Security”, TMH, 2003.
4. Charles B. Pfleeger and Shari Lawrence Pfleeger, “Security in Computing”, 3rd Edition, Pearson Education, 2003.

SOFT COMPUTING

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

REFERENCES

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

INTELLECTUAL PROPERTY RIGHTS (IPR)

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UNIT I **5**

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).

UNIT II **10**

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.

UNIT III **10**

International convention relating to intellectual property – Establishment of WIPO – Mission and activities – History – General agreement on Trade and Tariff (GATT).

UNIT IV **10**

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.

UNIT V **10**

Case studies on – Patents (basumati rice, turmeric, neem, etc.) – Copyright and related rights – Trade marks – Industrial design and integrated circuits – Geographic indications – Protection against unfair competition.

Total: 45

TEXT BOOK

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

REFERENCES

1. Eli Whitney, United States Patent Number: 72x, Cotton Gin, 2009.
2. "Intellectual Property Today", Volume 8, No. 5, 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.

INDIAN CONSTITUTION AND SOCIETY

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UNIT I **9**

Historical background – Constituent assembly of India – Philosophical foundations of the Indian constitution – Preamble – Fundamental rights – Directive principles of state policy – Fundamental duties – Citizenship – Constitutional remedies for citizens.

UNIT II **9**

Union government – Structures of the union government and functions – President – Vice president – Prime minister – Cabinet – Parliament – Supreme court of India – Judicial review.

UNIT III **9**

State government – Structure and functions – Governor – Chief minister – Cabinet – State legislature – Judicial system in states – High courts and other subordinate courts.

UNIT IV **9**

Indian federal system – Center – State relations – President's rule – Constitutional amendments – Constitutional functionaries – Assessment of working of the parliamentary system in India.

UNIT V **9**

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.

Total: 45

TEXT BOOKS

1. Durga Das Basu, "Introduction to the Constitution of India", PHI, 1996.
2. Agarwal R.C., "Indian Political System", S. Chand and Company, 1997.
3. Maciver and Page, "Society: An Introduction Analysis", Mac Milan India Ltd., 1997.
4. Sharma K.L., "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, 1997.

REFERENCES

1. Sharma, Brij Kishore, "Introduction to the Constitution of India", 5th Edition, PHI, 2008.
2. Gahai U.R., "Indian Political System", New Academic Publishing House, 1998.
3. Sharma R.N., "Indian Social Problems", Media Promoters and Publishers Pvt. Ltd, 1997.
4. Yogendra Singh, "Social Stratification and Charge in India", Manohar, 1997