

ANNA UNIVERSITY TIRUCHIRAPPALLI

Tiruchirappalli - 620 024

Regulations 2007

Curriculum

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER III

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	MA1201	Mathematics III	3	1	0	100
2	EE1205	Circuit Analysis	3	1	0	100
3	EC1201	Electronic Devices	3	1	0	100
4	EC1202	Digital System Design	3	1	0	100
5	CS1201	Data Structures	3	0	0	100
6	HS1201	Environmental Science and Engineering	3	0	0	100
Practical						
7	EC1203	Electronic Devices Laboratory	0	0	3	100
8	EC1204	Digital System Design Laboratory	0	0	3	100
9	CS1204	Data Structures Laboratory	0	0	3	100

SEMESTER IV

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	MA1253	Random Processes	3	1	0	100
2	EC1251	Electronic Circuits	3	1	0	100
3	EC1252	Linear Integrated Circuits	3	0	0	100
4	EC1205	Signals and Systems	3	1	0	100
5	EC1253	Electromagnetic Fields	3	1	0	100
6	EE1261	Electrical Machines	3	0	0	100
Practical						
7	EC1254	Electronics Circuits and Simulation Laboratory	0	0	3	100
8	EC1255	Linear Integrated Circuits Laboratory	0	0	3	100
9	EE1260	Electrical Machines Laboratory	0	0	3	100

SEMESTER V

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	MA1251	Numerical Methods	3	1	0	100
2	EC1301	Microprocessors and Microcontrollers	3	1	0	100
3	EC1302	Communication Systems	3	0	0	100
4	EC1303	Digital Signal Processing	3	1	0	100
5	EC1304	Transmission Lines and Waveguides	3	0	0	100
6	EE1304	Control Systems	3	1	0	100
Practical						
7	EC1305	Microprocessors and Microcontrollers Laboratory	0	0	3	100
8	EC1306	Digital Signal Processing Laboratory	0	0	3	100
9	HS1301	Communication and Soft Skills Laboratory	0	0	3	100

SEMESTER VI

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	EC1351	Measurements and Instrumentation	3	0	0	100
2	EC1352	Digital Communication Techniques	3	0	0	100
3	CS1302	Computer Networks	3	0	0	100
4	EC1353	Antennas and Wave Propagation	3	1	0	100
5	CS1203	Computer Architecture	3	1	0	100
6	EC1354	VLSI Design	3	0	0	100
Practical						
7	EC1355	Digital Communication Laboratory	0	0	3	100
8	CS1305	Networks Laboratory	0	0	3	100
9	EC1356	VLSI Design Laboratory	0	0	3	100

SEMESTER VII

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	EC1401	Embedded Systems	3	0	0	100
2	EC1402	Optical Communication and Networks	3	0	0	100
3	EC1403	Microwave Engineering	3	1	0	100
4	EC1404	Telecommunication Switching and Networks	3	0	0	100
5	E1****	Elective I	3	0	0	100
6	E2****	Elective II	3	0	0	100
Practical						
7	EC1405	Embedded Systems Laboratory	0	0	3	100
8	EC1406	Optical and Microwave Laboratory	0	0	3	100
9	EC1407	Electronic System Design Laboratory	0	0	3	100

SEMESTER VIII

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	MG1352	Total Quality Management	3	0	0	100
2	EC1451	Mobile and Wireless Communication	3	1	0	100
3	E3****	Elective III	3	0	0	100
4	E4****	Elective IV	3	0	0	100
Practical						
5	EC1455	Project Work	0	0	12	200

LIST OF ELECTIVES FOR ODD SEMESTER

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	EC1001	Medical Electronics	3	0	0	100
2	EC1002	Speech Processing	3	0	0	100
3	EC1003	Advanced Microprocessors	3	0	0	100
4	EC1004	Advanced Digital Signal Processing	3	0	0	100
5	EC1005	Electromagnetic Interference and Compatibility	3	0	0	100
6	EC1006	Power Electronics	3	0	0	100
7	EC1007	Television and Video Engineering	3	0	0	100
8	CS1025	High Speed Networks	3	0	0	100
9	CS1026	Operating Systems	3	0	0	100
10	CS1027	Internet and Java Programming	3	0	0	100
11	CS1021	Soft Computing	3	0	0	100
12	EC1008	Satellite Communication	3	0	0	100
13	EC1009	Computer Hardware and Interfacing	3	0	0	100
14	GE1351	Professional Ethics and Human Values	3	0	0	100

LIST OF ELECTIVES FOR EVEN SEMESTER

S.No.	Subject Code	Subject	L	T	P	Max. Marks
Theory						
1	EC1010	Advanced Electronic System Design	3	0	0	100
2	EC1011	Optoelectronic Devices	3	0	0	100
3	EC1012	Telecommunication System Modeling and Simulation	3	0	0	100
4	EC1013	Radar and Navigational Aids	3	0	0	100
5	EC1014	Engineering Acoustics	3	0	0	100
6	EC1015	Robotics	3	0	0	100
7	CS1002	Digital Image Processing	3	0	0	100
8	CS1028	Wireless Networks	3	0	0	100
9	CS1029	Network Security	3	0	0	100
10	GE1001	Intellectual Property Rights	3	0	0	100
11	GE1002	Indian Constitution and Society	3	0	0	100

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Regulations 2007

Syllabus

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER III

MA1201 – MATHEMATICS III

(Common to all branches)

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UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9

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

UNIT II FOURIER SERIES 9

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 III BOUNDARY VALUE PROBLEMS 9

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

UNIT IV FOURIER TRANSFORM 9

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

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 9

Z–Transform – 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”, Fortieth Edition , Khanna Publishers, 2007.

REFERENCES

1. Churchill R.V. and Brown J.W., “Fourier Series and Boundary Value Problems”, Fourth Edition , McGraw-Hill Book Co., 1987.
2. Veerarajan .T, “Engineering Mathematics III”, Tata McGraw-Hill Education, Third Edition, 2007.
3. Kandasamy P., Thilagavathy K. and Gunavathy K., “Engineering Mathematics Volume III”, S. Chand and Company ltd., 1996.

EE1205 – CIRCUIT ANALYSIS

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3 1 0

UNIT I DC CIRCUIT ANALYSIS 9

Basic components and electric circuits – Charge – Current – Voltage and Power– Voltage and Current Sources – Ohms Law – Voltage and Current laws – Kirchoff’s Current Law – Kirchoff’s voltage law – The single Node – Pair Circuit – Series and Parallel Connected Independent Sources – Resistors in Series and Parallel – Voltage and Current division – Basic Nodal and Mesh analysis – Nodal analysis – Mesh analysis.

UNIT II NETWORK THEOREM AND DUALITY 8

Useful Circuit Analysis techniques – Linearity and superposition – Thevenin and Norton Equivalent Circuits – Maximum Power Transfer – Delta – Wye Conversion – Duality – Dual circuits.

UNIT III SINUSOIDAL STEADY STATE ANALYSIS 10

Sinusoidal Steady – State analysis – Characteristics of Sinusoids– The Complex Forcing Function– The Phasor– Phasor relationship for R– L – C – impedance and Admittance – Nodal and Mesh Analysis– Phasor Diagrams – AC Circuit Power Analysis – Instantaneous Power – Average Power – apparent Power and Power Factor – Complex Power.

UNIT IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS 9

Basic RL and RC Circuits – The Source – Free RL Circuit – The Source–Free RC Circuit – The Unit-Step Function – Driven RL Circuits – Driven RC Circuits – RLC Circuits – Frequency Response – Parallel Resonance – Series Resonance – Quality Factor.

UNIT V COUPLED CIRCUITS AND TOPOLOGY 9

Magnetically coupled circuits – Mutual inductance – the Linear Transformer – the Ideal Transformer – An introduction to Network Topology – Trees and General Nodal analysis – Links and Loop analysis.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. William H.Hayt, Jr.Jack E. Kemmerly, Steven M.Durbin, “Engineering Circuit Analysis”, Sixth Edition , Tata McGraw-Hill, 2006.
2. David A Bell, “Electric Circuits”, PHI, 2006.

REFERENCES

1. Nilson,Reidal., “Electric Circuits” Eighth Edition , Pearson Education, 2008
2. Charles K. Alexander and Mathew N.O.Sadiku, “Fundamentals of Electric Circuits”, Second Edition , McGraw- Hill, 2003.
3. Sudhakar and Shyammohan S. Palli, Third Edition , Tata Mc Graw -Hill, 2007.
4. D.R.Cunningham, J.A.Stuller, “Basic Circuit Analysis”, Jaico Publishing House, 1996.
5. David E.Johnson, Johny R. Johnson, John L.Hilburn, “Electric Circuit Analysis”, Second Edition , Prentice-Hall, 1997
6. K.V.V.Murthy, M.S.Kamath, “Basic Circuit Analysis”, Jaico Publishing House, 1999.

EC1201 – ELECTRONIC DEVICES

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UNIT I ELECTRON BALLISTICS AND APPLICATIONS 9

Force on charged particles in an electric field – magnetic field – calculation of electrostatic and magnetic deflection sensitivity in cathode ray tube – analysis of parallel and perpendicular electric and magnetic fields – cyclotron – energy band structure of conductors – intrinsic and extrinsic semiconductor – N and P type – insulators – Hall effect.

UNIT II SEMICONDUCTOR DIODES 9

PN junction – derivation of diode equation – current components – switching characteristics of diode – common diode applications – characteristics and applications of Varactor diode and Zener diode – Mechanism of Avalanche and Zener breakdown – backward diode – tunnel diode – PIN diode – point contact diode – Schottky barrier diode – photo diode – APD – light emitting diodes.

UNIT III BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS 9

Bipolar junction transistor – PNP and NPN action – current components – Eber-Moll model – transistor switching times – comparison of CE, CB and CC configuration – BJT applications – construction and characteristics of JFET – Relation between Pinch-off voltage and Drain current – MOSFET – enhancement and depletion types – MESFET – introduction to VMOS and CMOS devices.

UNIT IV TRANSISTOR BIASING 9

BJT – operating point – need for biasing – various biasing methods of BJT – bias stability – stability parameters – biasing methods of FET – use of JFET as a voltage variable resistor (VVR).

UNIT V REGULATED POWER SUPPLY AND POWER CONTROL DEVICES 9

Basic elements of regulated power supply system – stabilization – series and shunt voltage regulators – general purpose and monolithic linear regulators – SMPS – power control devices – characteristics and equivalent circuit of UJT – intrinsic stand off ratio – PUT – PNP diode – two transistor model – SUS, SCR, DIAC, TRIAC.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Jacob Millman and Christos C. Halkias, “Electronic Devices and Circuits” Tata McGraw-Hill, 1991.
2. Robert T. Paynter, “Introductory Electronic Devices and Circuits”, Seventh Edition, Pearson Education, 2006.

REFERENCES

1. R.L. Boylestad and L. Nashelsky, “Electronic Devices and Circuit Theory”, Prentice Hall of India, 1997
2. Allen Mottershead, “Electronic Devices and Circuits – An Introduction”, Prentice Hall of India, 2003.
3. S. Salivahanan, N. Sureshkumar and A. Vallavaraj, “Electronic Devices and Circuits”, Tata McGraw-Hill, 1998.

EC1202 – DIGITAL SYSTEM DESIGN

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UNIT I BASIC CONCEPTS AND COMBINATIONAL CIRCUITS 9

Number Systems – n’s complement – Codes – Sum of products and product of sums– Minterms and Maxterms– Karnaugh map and Tabulation method – problem formulation and design of Combinational Circuits – Adder – Subtractor – Encoder/decoder – three state devices, Priority Encoder– Mux/Demux – Code–converters – Comparators.

UNIT II SEQUENTIAL CIRCUITS 9

Flip flops – SR– JK– T– D– Master/Slave FF– Triggering of FF– Analysis of clocked sequential circuits – their design– state minimization – Moore/Mealy model – state assignment – circuit implementation – Registers – shift registers – Ripple counters– Synchronous counters – Timing signal – RAM – Memory decoding – Semiconductor memories – Feedback sequential – Circuit analysis and design – Sequential Circuit Design with Verilog.

UNIT III FUNDAMENTAL MODE SEQUENTIAL CIRCUITS 9

Stable – Unstable states – output specifications – cycles and races – state reduction – race free assignments – Hazards – Essential Hazards – Pulse mode sequential circuits – Design of Hazard free circuit.

UNIT IV MEMORY, CPLDs AND FPGAs 9

Classification of memories – Implementation of combinational logic using standard ICs – ROM – EPROM and EEPROM– ROM – Read/Write memory – Static RAM – Dynamic RAM– PAL– PLA– CPLD – FPGA XL 4000 – CLBs – I/O Block – Programmable Inter connects – Realization of simple combinational and sequential circuits – Coding of Combination Circuits using Verilog

UNIT V LOGIC FAMILIES 9

Logic families – TTL – NMOS – CMOS – BiCMOS logic–Electrical behavior–static– dynamic – CMOS input and output structures – CMOS logic families – low voltage CMOS logic and interfacing – Bipolar logic realization of NAND and NOR logic.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Morris Mano, “ Digital logic ”, Prentice Hall of India, 1998
2. John. F. Wakerly, “Digital design principles and practices”, Fourth Edition , Pearson Education, 2007.

REFERENCES

1. Charles H. Roth, Jr, “Fundamentals of Logic Design”, Fourth Edition , Jaico Books, 2002
2. Floyd T.L., “Digital Fundamentals”, Charles E. Merrill publishing company, 1982
3. Jain R.P., “Modern Digital Electronics”, Tata McGraw Hill, 1999.
4. Donald L Schillings, Charles Belove., “Electronic circuits – Discrete and Integrated”, McGrawHill.

CS1201 – DATA STRUCTURES

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3 0 0

UNIT I PROBLEM SOLVING

9

Problem Solving – Top-down Design – Implementation – Verification – Efficiency – Analysis – Sample Algorithms.

UNIT II LISTS - STACKS AND QUEUES

8

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

UNIT III TREES

10

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

UNIT IV SORTING

9

Insertion Sort–Shell Sort – Heap Sort – Merge Sort – Quick Sort – External Sorting

UNIT V GRAPHS

9

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

Total: 45

TEXT BOOKS

1. R. G. Dromey, “How to Solve it by Computer” (Chapters 1 -2), Prentice-Hall of India, 2002.
2. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition , Pearson Education, 2002.

REFERENCES

1. Y. Langsam M. J. Augenstein and A. M. Tenenbaum, “Data Structures using C”, Pearson Education, 2004
2. Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures - A Pseudocode Approach with C”, Thomson Brooks / COLE, 1998.
3. Aho J. E. Hopcroft and J. D. Ullman, “Data Structures and Algorithms”, Pearson education, 1983.
4. Harowitz,Sahani,Anderson-Freed, Second Edition, “Fundamentals of Data Structures in C”, 2007.

HS1201 – ENVIRONMENTAL SCIENCE AND ENGINEERING

L T P
3 0 0

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

REFERENCES

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

EC1203 – ELECTRONIC DEVICES LABORATORY

L	T	P
0	0	3

1. Measurement of characteristics of PN Junction Diode.
2. Measurement of characteristics of Zener Diode
3. Measurement of characteristics of Special Diodes such as
 - (i) Varactor Diode
 - (ii) Tunnel Diode
 - (iii) Photo Diode
 - (iv) Schottky Diode
4. Clipper and Clamper Circuits using Diode.
5. Design and testing of Rectifiers with and without Filters.
6. Input and Output characteristics of BJT and determination of h- parameters from the graph.
7. Output characteristics of JFET.
 - (i) Plot of Transfer characteristics from the output characteristics.
 - (ii) Determination of pinch off voltage and I_{DSS}
8. Fixed Bias amplifier circuits using BJT.
 - (i) Waveforms at input and output without bias.
 - (ii) Determination of bias resistance to locate Q-point at center of load line.
 - (iii) Measurement of h_{FE} and gain.
 - (iv) Calculation of $h_{i_e} = V_T / I_{B_{dc}}$ and gain assuming $h_{FE} = h_{f_e}$.
 - (v) Plot of frequency response.
9. BJT Amplifier using voltage divider bias (self bias) with unbypassed emitter resistor.
 - (i) Measurement of input resistance and gain
 - (ii) Comparison with calculated values.
 - (iii) Plot of DC collector current as a function of collector resistance.
10. Source follower with Bootstrapped gate resistance.
 - (i) Measurement of gain, input resistance and output resistance with and without
 - (ii) Bootstrapping.
 - (iii) Comparison with calculated values.
11. Measurement of UJT and SCR Characteristics.
 - (i) Firing Characteristics of SCR.
 - (ii) Measurements of Intrinsic stand off ratio of UJT.
 - (iii) Measurement of DIAC and TRIAC Characteristics.
12. Study of SMPS.

Total: 45

EC1204 – DIGITAL SYSTEM DESIGN LABORATORY

L	T	P
0	0	3

1. Design and implementation of Adders and Subtractors using logic gates.
2. Design and implementation of code converters using logic gates
 - (i) BCD to excess–3 code and vice versa
 - (ii) Binary to gray and vice-versa
3. Design and implementation of 4 bit binary Adder/ subtractor and BCD adder using IC 7483
4. Design and implementation of 2 Bit Magnitude Comparator using logic gates 8 Bit Magnitude Comparator using IC 7485
5. Design and implementation of 16 bit odd/even parity checker generator using IC74180.
6. Design and implementation of Multiplexer and De–multiplexer using logic gates and study of IC74150 and IC 74154
7. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147
8. Construction and verification of 4 bit ripple counter and Mod–10 / Mod–12 Ripple counters
9. Design and implementation of 3–bit synchronous up/down counter
10. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip– flops

Total: 45

CS1204 – DATA STRUCTURES LABORATORY

L	T	P
0	0	3

Implement the following exercises using C:

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

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

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

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

6. Implement the application for checking ‘Balanced Paranthesis’ using array implementation of
7. Stack ADT (by implementing files (a) and (b) given above)
8. Implement the application for checking ‘Balanced Paranthesis’ using linked list implementation of Stack ADT by using file (a) from experiment 6 and implementing file (c)
Implement the application for ‘Evaluating Postfix Expressions’ using array and linked list implementations of Stack ADT (by implementing file (d) and using file (b) – and then by using files (d) and (c))
9. Queue ADT
10. Search Tree ADT – Binary Search Tree
11. Heap Sort
12. Quick Sort

Total: 45

EC1251 – ELECTRONIC CIRCUITS

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9

UNIT I MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS

Midband analysis of single stage CE, CB and CC amplifiers – Miller’s theorem – comparison of CB, CE and CC amplifiers – Darlington connection using similar and complementary transistors – bootstrapping – basic emitter coupled differential amplifier circuit – CMRR – use of constant current circuit to improve CMRR – use as linear amplifier – limiter – amplitude modulator – FET amplifiers – CS, CG and CD – multistage amplifiers.

UNIT II FREQUENCY RESPONSE OF AMPLIFIERS **9**

General shape of frequency response of amplifiers – cut-off frequencies and bandwidth – low frequency analysis of amplifiers – hybrid – pi equivalent circuit of BJT – high frequency analysis of BJT amplifiers – FET – high frequency analysis – gain-bandwidth product – multistage amplifiers – amplifier rise time and lag time with relation to cut off frequencies.

UNIT III UNTUNED AMPLIFIERS **9**

Amplifiers – classification – distortion – frequency response -analysis of low frequency response of RC-coupled amplifier – cascaded CE stage – step response of an amplifier – bandpass of cascaded stages – effect of an emitter (or a source) by pass capacitor on low – frequency response – noise.

UNIT IV FEEDBACK AMPLIFIERS AND OSCILLATORS **9**

Feedback concept – characteristics of negative feedback amplifiers – analysis of feedback amplifiers – voltage series – voltage shunt – current series – current shunt types – oscillator – general form – analysis of sinusoidal – phase-shift – resonant – circuit – Wien Bridge – Colpits – Unijunction and Crystal oscillator.

UNIT V LARGE SIGNAL AMPLIFIERS **9**

Classification of amplifiers (class A, B, AB, C and D) – efficiency of class A – RC coupled and transformer-coupled power amplifiers – class B complementary-symmetry – push-pull power amplifiers – calculation of power output – efficiency and power dissipation – crossover distortion and methods of elimination – heat sink design.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. J. Millman and C. Halkias, “Integrated Electronics”, Tata McGraw-Hill.
2. T. Robert Paynter, “Introductory Electronic Devices and Circuits”, Seventh Edition, Pearson Education, 2006.

REFERENCES

1. L. Robert Boylestad and Louis Nashelsky, Eighth Edition, Pearson Education, 2002.
2. Jacob Millman and Christos C. Halkias, “Electronic Devices and Circuits” Tata McGraw-Hill, 1991.
3. S. Salivahanan, N. Sureshkumar and A. Vallava Raj, “Electronic Devices and Circuits”, Tata McGraw-Hill, 1998.
4. Floyd, “Electronic Devices”, Sixth Edition, Pearson Education, 2003.

EC1252 – LINEAR INTEGRATED CIRCUITS

L T P
3 0 0

UNIT I CIRCUIT CONFIGURATION FOR LINEAR ICs 9

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

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

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

UNIT III ANALOG MULTIPLIER AND PLL 9

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

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS 9

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

UNIT V SPECIAL FUNCTION INTEGRATED CIRCUITS 9

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

Total: 45

TEXT BOOKS

1. Sergio Franco, “Design with operational amplifiers and analog integrated circuits”, McGraw–Hill, 1997.
2. D.Roy Choudhry and Shail Jain, “Linear Integrated Circuits”, New Age International, 2000.

REFERENCES

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

UNIT I REPRESENTATION OF SIGNALS 9

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

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS 9

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

UNIT III SAMPLING THEOREM AND Z – TRANSFORMS 9

Representation of continuous time signals by its sample – Sampling theorem – Reconstruction of a Signal from its samples – aliasing – discrete time processing of continuous time signals – sampling of band pass signals. Basic principles of z – transform – definition – Region Of Convergence (ROC) – properties of ROC – Properties of z – transform – Poles and Zeros – inverse z – transform using Contour integration – Residue Theorem – Power Series expansion and Partial fraction expansion – Relationship between z –transform and Fourier transform.

UNIT IV DISCRETE TIME SYSTEMS 9

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

UNIT V SYSTEMS WITH FINITE AND INFINITE DURATION IMPULSE RESPONSE 9

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

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Alan V. Oppenheim, Alan S. Willsky with S. Hamid Nawab, “Signals and Systems”, Second Edition, Pearson Education, 1997.
2. Alan V. Oppenheim, Ronald W. Schaffer, “Digital Signal Processing”, Prentice Hall of India

REFERENCES

1. John G. Proakis and Dimitris G. Manolakis, “Digital Signal Processing-Principles, Algorithms and Applications”, Third edition, PHI, 2000.
2. M.J. Roberts, “Signals and Systems Analysis using Transform method and MATLAB”, TMH, 2003.
3. Simon Haykin and Barry Van Veen, “Signals and Systems”, John Wiley, 1999.
4. Moman H. Hays, “Digital Signal Processing”, Schaum’s outlines, Tata McGraw-Hill, 2004.

TEXTBOOKS

1. William H.Hayt : “Engineering Electromagnetics”, Tata Mc GrawHill, 2003.
2. E.C. Jordan and K.G. Balmain, “Electromagnetic Waves and Radiating Systems”, Second Edition , Prentice Hall of India, 2003.

REFERENCES

1. Ramo, Whinnery and Van Duzer, “Fields and Waves in Communications Electronics”, Third Edition , John Wiley and Sons, 2003.
2. Narayana Rao, N, “Elements of Engineering Electromagnetics”, Fourth Edition , Prentice Hall of India, 1998.
3. M.N.O.Sadiku, “Elements of Engineering Electromagnetics”, Third Edition , Oxford University Press, 2000.
4. David K.Chernp, “Field and Wave Electromagnetics”, Second Edition , Pearson Edition, 2004.
5. David J.Grithiths, “Introduction to Electrodynamics”, Third Edition , PHI, 2004.

EE1261 – ELECTRICAL MACHINES

L T P
3 0 0

UNIT I D.C. MACHINES 9

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

UNIT II TRANSFORMERS 9

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

UNIT III INDUCTION MOTORS 9

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

UNIT IV SYNCHRONOUS AND SPECIAL MACHINES 9

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

UNIT V TRANSMISSION AND DISTRIBUTION 9

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

Total: 45

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, “Basic Electrical Engineering”, Second Edition, Tata McGraw Hill, 2002.
2. C.L. Wadhwa, “Electrical Power Systems”, Wiley eastern, 1985.

REFERENCES

1. S.K.Bhattacharya, “Electrical Machines”, Second Edition, Tata McGraw Hill, 1998.
2. V.K.Mehta and Rohit Mehta, “Principles of Power System”, Third Edition, S.Chand and Company, 2003.

EC1254 – ELECTRONICS CIRCUITS AND SIMULATION LABORATORY

L	T	P
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1. Series and Shunt feedback amplifiers - Frequency response, Input and output impedance calculation
2. Class B Complementary symmetry power amplifier
 - Observation of the output wave form with cross over Distortion.
 - Modification of the circuit to avoid cross over distortion.
 - Measurement of maximum power output.
 - Determination of efficiency.
 - Comparison with calculated values.
3. Differential amplifier using BJT.
 - Construction of the circuit.
 - Measurement of DC collector current of individual transistors.
 - Equalization of DC current using individual emitter resistance (50 – 100 Ohms)
 - Measurement of CMRR.
4. Design of oscillator
 - RC Phase shift
 - Wein Bridge Oscillator
 - Hartley and Colpitts Oscillator.
5. Class C Tuned Amplifier.

SIMULATION USING PSPICE / MULTISIM

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

Total: 45

EC1255 – LINEAR INTEGRATED CIRCUITS LABORATORY

L	T	P
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DESIGN AND TESTING

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

Total: 45

EE1260 – ELECTRICAL MACHINES LABORATORY

L	T	P
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1. Open circuit and load characteristics of separately excited and self excited D.C. generator.
2. Load test on D.C. shunt motor.
3. Load test on D.C. series motor.
4. Swinburne's test and speed control of D.C. shunt motor.
5. Load test on single phase transformer and open circuit and short circuit test on single phase transformer
6. Regulation of three phase alternator by EMF and MMF methods.
7. Load test on three phase induction motor.
8. No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)
9. Load test on single-phase induction motor.
10. Study of D.C. motor and induction motor starters.

Total: 45

SEMESTER V

MA1251 – NUMERICAL METHODS

L T P
3 1 0

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 9

Linear interpolation methods (method of false position) – Newton’s method –Solution of linear system by Gaussian elimination and Gauss – Jordan methods – iterative methods: Gauss Jacobi and Gauss-Seidel methods – Inverse of a matrix by Gauss–Jordan method – Eigen value 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 formulae.

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 – 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’s method – Modified and Improved Euler’s method – Fourth order Runge-Kutta method for solving first and second order equations – Multi-step 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 implicit and explicit methods – one dimensional wave equation and two dimensional Laplace and Poisson equations.

L: 45 T: 15 Total: 60

TEXT BOOK

1. C.F. Gerald and P.O. Wheatley “Applied Numerical Analysis”, Seventh Edition, Pearson Education, 2007.

REFERENCES

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, “Numerical Methods for Scientific and Engineering Computation” Fourth Edition, New Age International Publishers, 2003.
2. M.K. Venkatraman, ‘Numerical Methods’, National Publication Company, 1991.
3. P. Kandasamy, K. Thilakavthy and K. Gunavathy, “Numerical Methods”, Second Edition, S.Chand and Co., 2003.

EC1301 – MICROPROCESSORS AND MICROCONTROLLERS

L T P
3 1 0

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 (I²C 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.

L:45 T:15 Total: 60

TEXT BOOKS

1. Ramesh S Gaonkar, “Microprocessor Architecture, Programming and application with 8085”, Fourth Edition, PHI, New Delhi, 2000.
2. John Uffenbeck, “The 80x86 Families, Design, Programming and Interfacing”, Third Edition, Pearson Education, 2002.
3. Mohammed Ali Mazidi and Janice Gillispie Mazidi, “The 8051 Microcontroller and Embedded Systems”, Pearson Education Asia, New Delhi, 2003.

REFERENCES

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

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 – Decimation in Frequency 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 – Prewarping – Impulse Invariant Transformation.

UNIT III FINITE WORD LENGTH EFFECTS 9

Quantization Noise – Derivation for Quantization Noise Power – Fixed Point and Binary Floating Point Number Representation – Comparison – Over Flow Error – Truncation Error – Co-Efficient Quantization Error – Limit Cycle Oscillation – Signal Scaling – Analytical Model of Sample and Hold Operations.

UNIT IV POWER SPECTRUM ESTIMATION 9

Computation of Energy Density Spectrum – Auto Correlation and Power Spectrum of Random Signals. Periodogram – Use of DFT in Power Spectrum Estimation – Non Parametric Methods for Power Spectral Estimation: Bartlett and Welch Methods – Blackman and Tukey Method.

UNIT V DIGITAL SIGNAL PROCESSORS 9

Introduction to DSP Architecture – Harvard Architecture – Dedicated MAC Unit – Multiple Alus, Advanced Addressing Modes – Pipelining – Overview of Instruction Set of TMS320C5X and C54X.

L:45 T:15 Total: 60**TEXT BOOKS**

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

REFERENCES

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

EC1304 – TRANSMISSION LINES AND WAVEGUIDES

L T P
3 0 0

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_0 – Transfer Impedance – Reflection Factor and Reflection Loss – T and Π Section Equivalent to Lines.

UNIT II THE LINE AT RADIO FREQUENCIES 9

Standing Waves and Standing Wave Ratio on a Line – One Eighth Wave Line – The Quarter Wave Line and Impedance Matching – The Half Wave Line – The Circle Diagram for the Dissipationless Line – The Smith Chart – Application of the Smith Chart – Conversion from Impedance to Reflection Coefficient and Vice-versa – Impedance to Admittance Conversion and 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 – Characteristic of TE and TM Waves – Cutoff Wavelength and Phase Velocity – Impossibility of TEM Waves in Waveguides – Dominant Mode in Rectangular Waveguide – Attenuation of TE and TM Modes in Rectangular Waveguides –Wave Impedances – Characteristic Impedance – Excitation of Modes.

UNIT V CIRCULAR WAVE GUIDES AND RESONATORS 10

Bessel Functions – Solution of Field Equations in Cylindrical Co-ordinates – TM and TE Waves in Circular Guides – Wave Impedances and Characteristic Impedance – Dominant Mode in Circular Waveguide – Excitation of modes – Microwave Cavities – Rectangular Cavity Resonators – Circular Cavity Resonator – Semicircular Cavity Resonator – Q Factor of a Cavity Resonator for TE_{101} Mode.

Total: 45

TEXT BOOKS

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

REFERENCES

1. Ramo, Whineery and Van Duzer, “Fields and Waves in Communication Electronics”, John Wiley, 2003.
2. David M.Pozar “Microwave Engineering”, Second Edition, John Wiley,2002.
3. David K. Cheng,”Field and Waves in Electromagnetism”, Pearson Education, 1989.

EE1304 – CONTROL SYSTEMS

L T P
3 1 0

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 and 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.

L:45 T:15 TOTAL: 60

TEXTBOOKS

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

REFERENCES

1. Benjamin C. Kuo, "Automatic Control Systems", Seventh Edition, PHI, 1995.
2. M. Gopal, "Digital Control and State Variable Methods", Second Edition, TMH, 2007.
3. Schaum’s Outline Series, "Feedback and Control Systems", TMH, 2007.
4. John J. Dazzo and Constantine H. Houpis, "Linear Control System Analysis and Design", TMH., 1995.
5. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Addison Wesley, 1999.

EC1305 – MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

L T P
0 0 3

LIST OF EXPERIMENTS

1. Programs for 8/16 Bit Arithmetic Operations (Using 8085).
2. Programs for Sorting and Searching (Using 8085, 8086).
3. Programs for String Manipulation Operations (Using 8086).
4. Programs for Digital Clock and Stop Watch (Using 8086).
5. Interfacing ADC and DAC.
6. Parallel Communication between Two 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

EC1306 – DIGITAL SIGNAL PROCESSING LABORATORY

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0 0 3

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 no of PCs and Printers	

(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, New Delhi, Pearson Education, 2009.

Total: 45

SEMESTER VI

EC1351 – MEASUREMENTS AND INSTRUMENTATION

L T P
3 0 0

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. Helfrick, A.D. and William Cooper, D., “Modern Electronic Instrumentation and Measurement Techniques”, PHI, 2003.

REFERENCES

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

EC1352 – DIGITAL COMMUNICATION TECHNIQUES

L T P
3 0 0

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 (DM) – Linear prediction – Differential Pulse Code Modulation (DPCM) – Adaptive Delta Modulation (ADM).

UNIT II BASEBAND PULSE TRANSMISSION 9

Matched filter – Error rate due to noise – Intersymbol interference – Nyquist's criterion for distortionless base band binary transmission – Correlative level coding – 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" John Wiley, 4th Edition, 2001.

REFERENCES

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

CS1302 – COMPUTER NETWORKS

L T P
3 0 0

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 – Internetworks – Packet switching and datagram approach – IP addressing methods – Subnetting – 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 BOOKS

1. Foruzan, B.A., “Data communication and Networking”, TMH, 2004.
2. Peterson, L.L. and Davie, P.S., “Computer Networks”, 2nd Edition, Harcourt Asia Pvt. Ltd., 2002.

REFERENCES

1. Tannenbaum, A.S., “Computer Networks”, 4th Edition, PHI, 2003.
2. William Stallings, “Data and Computer Communication”, 6th Edition, Pearson Education, 2000.
3. Kurouse, J.F. and Rouse W., “Computer Networking: A Topdown Approach Featuring”, Pearson Education, 2003.

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 a wavelength and resultant circular polarization on axis – Helical antenna – Normal mode and axial mode operation.

Antenna Arrays: Expression for electric field from two and three element arrays –Uniform linear array – Method of pattern multiplication – Binomial array – 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 mono-pole – 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 – Luxemburg 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.

TEXTBOOK

1. Kraus, J.D. and Ronald Marhefka, "Antennas", TMH Book Company, 2002.

REFERENCES

1. Jordan and Balmain, E. C., "Electro Magnetic Waves and Radiating System", 1968, Reprint 2003, PHI.
2. Collins, R. E., "Antennas and Radio Propagation", TMH, 1999.
3. Balanis, "Antenna Theory", 2nd Edition, John Wiley and Sons, 2003.

CS1203 – COMPUTER ARCHITECTURE

L T P
3 1 0

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 and Architecture – Designing for Performance”, 6th Edition, Pearson Education, 2003.
2. Patterson, D.A. and Hennessy, J.L., “Computer Organization and Design, the Hardware / Software Interface”, 2nd Edition, Morgan Kaufmann, 2002 reprint.
3. Hayes, J.P., “Computer Architecture and Organization”, 3rd Edition, TMH, 1998.

EC1354 – VLSI DESIGN

L T P
3 0 0

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.

UNIT V VERILOG HARDWARE DESCRIPTION LANGUAGE 9

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

Total: 45

TEXT BOOKS

1. Weste, N. H. E. and Kamran Eshraghian, “Principles of CMOS VLSI Design”, 2nd Edition, Pearson Education Asia, 2000.
2. Uyemura, J. P., “Introduction to VLSI Circuits and Systems”, John Wiley and Sons, Inc., 2002.

REFERENCES

1. Bhasker, J., “A Verilog HDL Primer”, 2nd Edition, B. S. Publications, 2001.
2. Pucknell, “Basic VLSI Design”, Prentice Hall of India, 1995.
3. Wayne Wolf, “Modern VLSI Design System on Chip”, Pearson Education, 2002.

EC1355 – DIGITAL COMMUNICATION LABORATORY

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LIST OF EXPERIMENTS

a) Antennas Laboratory

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

b) Analog and Digital Communication Laboratory

4. Characteristics of AM receiver (selectivity and sensitivity)
5. Characteristics of FM receiver (selectivity and sensitivity)
6. Sampling and time division multiplexing
7. Pulse Modulation– PAM / PWM /PPM
8. Pulse Code Modulation
9. Line Coding and 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 kit with 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	

CS1305 – NETWORKS LABORATORY

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LIST OF EXPERIMENTS

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 Go-back-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 processing

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 .	

EC1356 – VLSI DESIGN LABORATORY

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LIST OF EXPERIMENTS

1. Study of simulation using tools.
2. Study of synthesis tools.
3. Place, 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/subtract 8 number of size, 12 bit 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 LEDs and switches using Verilog codes.
9. Testing the traffic controller design developed in SI. NO.5 on the FPGA board.
10. Design a real-time 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

EC1401 – EMBEDDED SYSTEMS

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3 0 0

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 organization and implementation – I/O subsystems – Interrupt routines handling in RTOS,

Real Time Operating Systems : RTOS task scheduling models – Handling of task scheduling and latency and deadlines as performance metrics – Co-operative round robin scheduling – Cyclic scheduling with time slicing (rate monotonic Co-operative scheduling) – Preemptive scheduling model strategy by a scheduler – Critical section service by a preemptive scheduler – Fixed (static) real time scheduling of tasks – INTER PROCESS COMMUNICATION AND SYNCHRONISATION – Shared data problem – Use of semaphore(S) – Priority inversion problem and deadlock situations – Inter process communications using signals – Semaphore flag or mutex as resource key – Message queues – Mailboxes – Pipes –Virtual (logical) sockets – Remote procedure calls (Rpcs).

UNIT V REAL TIME OPERATING SYSTEMS –PART – 2 9

Study of micro C/OS–II or Vx works or any other popular RTOS – RTOS system level functions – Task service functions – Time delay functions – Memory allocation related functions – Semaphore related functions – Mailbox related functions – Queue related functions – Case studies of programming with RTOS – Understanding case definition –Multiple tasks and their functions – Creating a list of tasks – Functions and Ipcs –Exemplary coding steps.

Total: 45

TEXTBOOKS

1. Wayne Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Morgan Kaufman Publishers, 1st Indian Reprint 2001.
2. Rajkamal, “Embedded Systems Architecture”, Programming and Design, TMH, 1st reprint 2003.

REFERENCES

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

EC1402 – OPTICAL COMMUNICATION AND NETWORKS

L T P
3 0 0

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 – Multihop – and Shufflenet multihop 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. Biswanath Mukherjee., “Optical Communication Networks”, TMH, 1997

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.

EC1403 – MICROWAVE ENGINEERING

L T P
3 1 0

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 – Gun diode – Mode of operation – Oscillator circuit – IMPATT diodes – Mechanism of operation – Application as oscillator and amplifiers – 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-guides method – Antenna measurement – Radiation pattern– Phase and gain.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Annapurna Das, Sisir K. Das, "Microwave Engineering", TMH Co., Ltd., 1999.
2. Collin, R.E., "Foundation of Microwave Engineering", 2nd Edition, TMH, 1992.

REFERENCES

1. Samuel Y. Liao., "Microwave devices and Circuits", PHI Pvt Ltd., 1995.
2. Reich, J.H., "Microwave", East West Press, 1978.

EC1404 – TELECOMMUNICATION SWITCHING AND NETWORKS

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UNIT I MULTIPLEXING 9

Transmission systems – FDM multiplexing and modulation – Time Division Multiplexing (TDM) – Digital transmission and multiplexing – Pulse transmission – SONET/SDH – SONET multiplexing overview – SONET frame formats – SONET operations – Administration and maintenance – Payload framing and frequency justification – Virtual tributaries – DS3 payload mapping – E4 payload mapping – SONET optical standards – SONET networks – SONET rings: Unidirectional path – Switched ring – Bidirectional line – Switched ring.

UNIT II DIGITAL SWITCHING 9

Switching functions – Space division switching – Time division switching – two-dimensional switching – STS switching – TST switching – No.4 ESS toll switch – Digital cross – Connect systems – Digital switching in an analog environment – Elements of SSN07 signaling.

UNIT III NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT 9

Timing – Timing recovery – Phase – Locked loop – Clock instability – Jitter measurements – Systematic jitter – Timing inaccuracies: Slips – Asynchronous multiplexing – Network synchronization – U.S. network synchronization – Network control – Network management.

UNIT IV DIGITAL SUBSCRIBER ACCESS 9

ISDN – ISDN basic rate access architecture – ISDN U interface – ISDN D channel protocol – High data rate digital subscriber loops – Asymmetric digital subscriber line – VDSL – Digital loop carrier systems – Universal digital loop carrier systems – Integrated digital loop carrier systems – Next-generation digital loop carrier – Fiber in the loop – Hybrid fiber coax systems – Voice band modems – PCM modems – Local microwave distribution service – Digital satellite services.

UNIT V TRAFFIC ANALYSIS 9

Traffic characterization – Arrival distributions – Holding time distributions – Loss systems – Network blocking probabilities – End-to-End blocking probabilities – Overflow traffic – Delay systems – Exponential service times – Constant service times – Finite queues.

Total: 45

TEXTBOOK

1. Bellamy John, “Digital Telephony”, 3rd Edition, John Wiley and Sons Inc., 2000.

REFERENCES

1. Viswanathan, T., “Telecommunication Switching System and Networks”, PHI Ltd., 1994.

EC1405 – EMBEDDED SYSTEMS LABORATORY

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0 0 3

LIST OF EXPERIMENTS

1. Open source software such as Linux flavors will be used. Ability to use industry standard tools for verification and validation
3. High level language programming (C, C++) and porting it on a processor
4. Create FSM of a typical application and implement on an FPGA
5. Application development, download. Partition between FPGA and ARM on performance characteristics
6. Application development. hardware and software partitioning
7. 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	

EC1406 – OPTICAL AND MICROWAVE LABORATORY

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0	0	3

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 semiconductor 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.	

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 systems design
Design of microcontroller based system for simple applications like security systems combination lock etc. Using flash microcontroller.
9. DSP based system design
Design a DSP based system for simple applications like echo generation, etc. using TMS 320 DSP kit.

TOTAL: 45

ELECTRONICS SYSTEM DESIGN LABORATORY

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.,	

SEMESTER VIII

MG1352 – TOTAL QUALITY MANAGEMENT

(Common to Biomedical, CSE, ECE and IT)

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3 0 0

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 system – Elements – Implementation of quality system – Documentation – Quality auditing – TS 16949 – ISO 14000 – Concept, requirements and benefits.

Total : 45

TEXT BOOKS

1. Dale H. Besterfield, “Total Quality Management”, Pearson Education, Inc. 2003.
2. James R. Evans and William M. Lidsay, “The Management and Control of Quality”, 5th Edition, South-Western, 2002.

REFERENCES

1. Feigenbaum, A.V., “Total Quality Management”, McGraw Hill, 1991.
2. Oakland, J.S., “Total Quality Management”, Butterworth Heineman, 1989.
3. Narayana V. and Sreenivasan, N.S., “Quality Management – Concepts and Tasks”, New Age International, 1996.
4. Zeiri, “Total Quality Management for Engineers”, Wood Head Publishers, 1991.

EC1451 – MOBILE AND WIRELESS COMMUNICATION

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UNIT I PRINCIPLES OF WIRELESS COMMUNICATION 10

Digital modulation techniques – Linear modulation techniques – Spread spectrum modulation – Performance of modulation – Multiple access techniques – TDMA – FHMA – 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 and 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).

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Theodore S. Rappaport, “Wireless Communications, Principles and Practice”, PHI, 1996.
2. Stallings, W., “Wireless Communications and Networks”, PHI, 2001.

REFERENCES

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

ELECTIVES SEVENTH SEMESTER

EC1001 – MEDICAL ELECTRONICS

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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

Ionizing radiation – Diagnostic X-ray equipments – Use of radio isotope in diagnosis – Radiation therapy.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

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

Total: 45

TEXTBOOK

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

REFERENCES

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

EC1002 – 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”, PHI, 1978.

REFERENCES

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

EC1004 – ADVANCED DIGITAL SIGNAL PROCESSING

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UNIT I PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION 9

Relationship between the auto correlation and the model parameters – The yule – Walker method for the AR model parameters – The burg method for the AR model parameters – Unconstrained least – Squares method for the AR model parameters – Sequential estimation methods for the AR model parameters – Selection of AR model order.

UNIT II ADAPTIVE SIGNAL PROCESSING 9

FIR adaptive filters – Steepest descent adaptive filter – LMS algorithm – Convergence of LMS algorithms – Application: Noise cancellation – Channel equalization – Adaptive recursive filters – Recursive least squares.

UNIT III MULTIRATE SIGNAL PROCESSING 9

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

UNIT IV SPEECH SIGNAL PROCESSING 9

Digital models for speech signal: Mechanism of speech production – Model for vocal tract, radiation and excitation – Complete model – Time domain processing of speech – Pitch period estimation – Using autocorrelation function – Linear predictive coding: Basic principles – Autocorrelation method – Durbin recursive solution.

UNIT V WAVELET TRANSFORMS 9

Fourier transform : Its power and limitations – Short time fourier transform – The gabort– 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.

EC1005 – ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

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3 0 0

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 international standardizing organizations – FCC – CISPR – ANSI – DOD – IEC – CENELEC – FCC – CE and RE standards – CISPR – CE and RE standards – IEC/EN – CS standards – Frequency assignment – Spectrum conversation.

UNIT IV EMI CONTROL METHODS AND FIXES 10

Shielding – Grounding – Bonding – Filtering – EMI gasket – Isolation transformer – Opto-isolator.

UNIT V EMC DESIGN AND INTERCONNECTION TECHNIQUES 9

Cable routing and connection – Component selection and mounting – PCB design – Trace routing – Impedance control – Decoupling – Zoning and grounding

Total: 45

TEXT BOOKS

1. Prasad Kodali, V., “Engineering Electromagnetic Compatibility”, S. Chand 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.

EC1006 – POWER ELECTRONICS

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UNIT I POWER ELECTRONICS DEVICES

9

Characteristics of power devices – Characteristics of SCR, Diac, Triac, SCS, GTO, PUJT – Power transistors – Power FETs – LASCR – Two transistor model of SCR – Protection of thyristors against over voltage – Over current, Dv/Dt and Di/Dt .

UNIT II TRIGGERING TECHNIQUES

9

Turn on circuits for SCR – Triggering with single pulse and train of pulses – Synchronizing with supply – Triggering with microprocessor – Forced commutation – Different techniques – Series and parallel operations of SCRs.

UNIT III CONTROLLED RECTIFIERS

9

Converters – Single phase – Three phases – 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.

EC1007 – 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 transmission sound signal transmission – Standard channel bandwidth.

UNIT II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER 9

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

UNIT III ESSENTIALS OF COLOUR TELEVISION 8

Compatibility – Colour perception – Three colour theory – Luminance, hue and saturation – Colour television cameras – Values of luminance and colour difference signals – Colour television display tubes – Delta – Gun – Precision – In-line and trinitron colour picture tubes – Purity and convergence – Purity and static and dynamic convergence adjustments– Pincushion correction techniques – Automatic degaussing circuit– Grey scale tracking – Colour signal transmission – Bandwidth – Modulation of colour difference signals – Weighting factors – Formation of chrominance signal.

UNIT IV COLOUR TELEVISION SYSTEMS 10

NTSC colour TV system – NTSC colour receiver – Limitations of NTSC system – PAL colour TV system – Cancellation of phase errors – PAL – D colour system – PAL coder – PAL – Decolour receiver – Chromo signal amplifier – Separation of U and V signals – Colour burst separation – Burst phase discriminator – ACC amplifier – Reference oscillator – Ident and colour killer circuits – U and V demodulators – Colour signal matrixing – Merits and demerits of the PAL system – SECAM system – Merits and demerits of SECAM system.

UNIT V ADVANCED TELEVISION SYSTEMS 10

Satellite TV technology – Cable TV – VCR – Video disc recording and playback – Tele text broadcast receiver – Digital television – Transmission and reception – Projection television – Flat panel display TV receiver – Sterio sound in TV – 3D TV – EDTV – Digital equipments for TV studios.

Total: 45

TEXT BOOKS

1. 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 International 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.

CS1025 – 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

UNITII CONGESTION AND TRAFFIC MANAGEMENT 8

Queuing analysis – Queuing models – Single server queues – Effects of congestion – Congestion control – Traffic management – Congestion control in packet switching Networks – Frame relay congestion control.

UNIT III TCP AND ATM CONGESTION CONTROL 12

TCP flow control – TCP congestion control – Retransmission – Timer management – Exponential RTO backoff – KARN’s algorithm – Window management – Performance of TCP over ATM.

Traffic and congestion control in ATM – Requirements – Attributes – Traffic management Frame work, traffic control – ABR traffic management – ABR rate control, RM cell formats, ABR capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 8

Integrated services architecture – Approach, components, services– Queuing discipline, FQ, PS, BRFQ, GPS, WFQ – Random early detection, differentiated services

UNIT V PROTOCOLS FOR QOS SUPPORT 8

RSVP – Goals and characteristics, data flow, RSVP operations, protocol mechanisms – Multiprotocol label switching – Operations, labels, protocol details – RTP – Protocol architecture – Data transfer protocol – RTCP.

Total: 45

TEXT BOOK

1. Jeanwarland 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 Apar., “Mpls and Vpn Architecture”, Cisco Press, Vol. 1 and 2, 2003.

UNIT I OPERATING SYSTEMS – AN OVERVIEW 8

Introduction to OS – Mainframe systems – Desktop systems – Multiprocessor systems – Distributed systems – Clustered systems – Real time systems – Handheld systems computer– System operation – I/O structure – Storage structure – Storage hierarchy – Hardware protection – Network structure – System components – Operating – System services – System calls – System programs – System structure – Virtual machines – System design and implementation – System generation.

UNIT II PROCESS MANAGEMENT 10

Process concept – Process scheduling – Operations on processes – Cooperating process – interprocess communication – Communication in client-server systems. Threads – overview – Multithreading models – Threading issues – CPU scheduling – Basic concepts – Scheduling criteria – Scheduling algorithms – Multiple – Processor scheduling – Real time scheduling – Process scheduling models. The critical– Section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – Atomic transactions. System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

UNIT III STORAGE MANAGEMENT 10

Storage management – Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual memory – Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing. File system implementation – File concept – Access methods – Directory structure – File – System mounting – File sharing – Production – File system structure – File system implementation – Directory implementation – Allocation methods – Free-space management – Efficiency and performance – Recovery.

UNIT IV I/O SYSTEMS 8

I/O hardware – Application I/O interface – Kernel I/O subsystem – Transforming I/O to hardware operations – Streams – Performance – Disk structure – Disk scheduling – Disk management – Swap– Space management – RAID structure – Disk attachment – Stable – Storage implementation – Tertiary storage structure.

UNIT V DISTRIBUTED SYSTEMS 9

Background – Topology – Network types – Communication – Communication protocols – Robustness – Design issues.

Naming and transparency – Remote file access – Stateful versus stateless service – File replication.

Event ordering – Mutual exclusion – Atomicity – Concurrency control – Deadlock handling – Election algorithms – Reaching agreement.

Total: 45

TEXT BOOKS

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.
2. Harvey M. Deitel., “Operating Systems”, 2nd Edition, Pearson Education Pvt. Ltd, 2002

REFERENCES

1. Andrew S. Tanenbaum., “Modern Operating Systems”, PHI Pvt. Ltd, 2003
2. William Stallings., “Operating System”, 4th Edition, PHI, 2003

CS1027 – 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 datagrams – Reliable stream transport service (TCP) TCP / IP over ATM networks – Internet applications – E-mail – Telnet – FTP – NFS – Internet Traffic management.

UNIT II INTERNET ROUTING 9

Concepts of graph theory – Routing protocols – Distance Vector Protocols (RIP) – Link State Protocol (OSPP) – Path Vector Protocols (BGP And IDRP) – Routing for high speed multimedia traffic – Multicasting – Resource Reservation (RSVP) – IP switching.

UNIT III WORLD WIDE WEB 9

HTTP protocol – Web browsers Netscape – Internet explorer – Web site and web page design – HTML – XML – Dynamic HTML – CGI.

UNIT IV JAVA PROGRAMMING 9

Language features – Classes – Object and methods – 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.

CS1021 – SOFT COMPUTING
(Common to Biomedical, CSE, ECE and IT)

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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 multilayer Perceptrons – Radial basis function networks – Unsupervised learning neural networks – Competitive learning networks – Kohonen self-organizing networks – Learning vectorq– 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 BOOKS

1. Jang, J.S.R., Sun, C.T. and Mizutani, E., “Neuro-Fuzzy and Soft Computing”, Pearson Education, 2004.
2. Ross, T.J., “Fuzzy Logic with Engineering Applications”, TMH, 1997.

REFERENCES

1. Goldberg, D.E., “Genetic Algorithms: Search- Optimization and Machine Learning”, Addison Wesley, 1989.
2. Rajasekaran, S. and Pai, G.A.V., “Neural Networks- Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
3. Eberhart, R., Simpson, P. and Dobbins, R., “Computational Intelligence – PC Tools”, AP Professional, Boston, 1996.
4. Sivanandhan and Deepa, “Principles of Soft Computing”, Wiley India, 2008.

UNIT I OVERVIEW OF SATELLITE SYSTEMS, ORBITS AND LAUNCHING METHODS 9

Introduction – Frequency allocations for satellite services – Intelsat – U.S. domsats – Polar orbiting satellites – Problems – Kepler’s first law – Kepler’s second law – Kepler’s third law – Definitions of terms for earth – Orbiting satellites – Orbital elements – Apogee and perigee heights – Orbital perturbations – Effects of a nonspherical earth – Atmospheric drag – Inclined orbits – Calendars – Universal time – Julian dates – Sidereal time – The orbital plane – The geocentric – Equatorial coordinate system – Earth station referred to the IJK frame – The topcentric – Horizon Co-ordinate system – The sub – Satellite point – Predicting satellite position.

UNIT II GEOSTATIONARY ORBIT AND SPACE SEGMENT 9

Introduction – Antenna look angels – The polar mount antenna – Limits of visibility – Near geostationary orbits – Earth eclipse of satellite – Sun transit outage – Launching orbits – Problems – Power supply – Attitude control – Spinning satellite stabilization – Momentum wheel stabilization – Station keeping – Thermal control – TTandC subsystem – Transponders – Wideb and 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 – Intermodulation noise.

UNIT IV SATELLITE ACCESS 9

Single access – Preassigned FDMA, demand – Assigned FDMA, SPADE system. bandwidth – Limited a power – Limited TWT amplifier operation, FDMA downlink analysis.

TDMA : Reference burst – Preamble and 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.

Companion of uplink power requirements for FDMA and TDMA. On-board signal processing for TDMA / FDMA operation – Satellite switched TDMA.

Code Division Multiple Access (CDMA) – Direct – Sequence spread spectrum – Code signal C(T) – Autocorrelation function for C(T) – Acquisition and trackling – Spectrum spreading and dispreading – CDMA throughput – Problems – Network layers – TCP link – Satellite links and TCP – Enhancing TCP over satellite channels using standard mechanisms (RFC– 2488) – Requests for comments – Split TCP connections – Asymmetric channels – Proposed systems – Direct broadcast satellite services.

UNIT V GEOGRAPHIC INFORMATION SYSTEM

9

GIS – Components of GIS – Hardware, software and organizational 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 – Application of remote sensing and GIS – Urban applications – Integration of GIS and remote sensing – Application of remote sensing and GIS – Water resources – Urban analysis – Watershed management – Resources information system – Global positioning system – 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. Pritchards, Henri G. Snyder 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.

EC1009 – 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 – Directx – Mice – Modems – Keyboards – Sound boards – Audio bench marks.

UNIT V BUS ARCHITECTURE 9

Buses – Industry Standard Architecture (ISA) – Peripheral Component Interconnect (PCI) – Accelerated Graphics Port (AGP) – Plug-and-Play (PnP) devices – SCSI concepts – USB architecture.

Total: 45

TEXT BOOKS

1. Stephen J. Bigelow, “Trouble Shooting, Maintaining and Repairing Pcs”, TMH, 2001.
2. Craig Zacker and John Rourke, “The Complete Reference: PC Hardware”, TMH, 2001.

REFERENCES

1. Mike Meyers., “Introduction to PC Hardware and Trouble Shooting”, TMH, 2003.
2. Govindarajulu, B., “IBM PC and Clones Hardware Trouble Shooting and Maintenance”, TMH, 2002.

GE1351 – PROFESSIONAL ETHICS AND HUMAN VALUES

(Common to Biomedical, CSE and ECE)

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3 0 0

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 issues – 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 reducing risk – The Three Mile Island and Chernobyl case studies.

Collegiality and loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime – Professional rights – Employee rights – Intellectual Property Rights (IPR) – Discrimination.

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", PHI, 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.

ELECTIVES FOR EIGHTH SEMESTER

EC1010 – 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 – Impedance and admittance transformation – Parallel and series connection of networks – ABCD and scattering parameters – Analysis of amplifier using scattering parameter. RF filter – Basic resonator and filter configurations – Butterworth and Chebyshev filters – Implementation of microstrip filter design – Band pass filter and cascading of band pass filter elements.

UNIT II RF TRANSISTOR AMPLIFIER DESIGN 9

Impedance matching using discrete components – Microstrip line matching networks – Amplifier classes of operation and biasing networks – Amplifier power gain – Unilateral design ($S_{12}=0$) – Simple input and output matching networks – Bilateral design – Stability circle and conditional stability – Simultaneous conjugate matching for unconditionally stable transistors – Broadband amplifiers – High power amplifiers and multistage amplifiers.

UNIT III DESIGN OF POWER SUPPLIES 9

DC power supply design using transistors and SCRs – Design of crowbar and foldback protection circuits – Switched Mode Power Supplies (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 of PCB.

Total: 45

TEXT BOOKS

1. Reinhold Ludwig 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 Jacob, "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.

EC1012 – 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 – Multipath channel and discrete channel noise and interference.

UNIT III ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION 9

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

UNIT IV SIMULATION AND MODELING METHODOLOGY 9

Simulation environment – Modeling considerations – Performance evaluation techniques – Error source simulation – Validation.

UNIT V CASE STUDIES 9

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

Total: 45

TEXTBOOK

1. 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 Gordon, “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.

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 – Monopulse tracking – Conical scan and sequential lobing – Limitations to tracking accuracy – Low-angle tracking – Tracking in range – Other tracking radar topics – Comparison of trackers – Automatic tracking with surveillance radars (ADT).

UNIT III 9

Detection of Signals in Noise – Introduction – Matched – Filter receiver – Detection criteria – Detectors – Automatic detector – Integrators – Constant – False – Alarm rate receivers – The radar operator – Signal management – Propagation radar waves – Atmospheric refraction – Standard propagation – Nonstandard propagation – The radar antenna – Reflector antennas – Electronically steered phased array antennas – Phase shifters – Frequency – Scan arrays

Radar Transmitters – Introduction – Linear beam power tubes – Solid state RF power sources – Magnetron – Crossed field amplifiers – Other RF power sources – Other aspects of radar transmitter.

Radar Receivers – The radar receiver – Receiver noise figure – Superheterodyne receiver – Duplexers and receiver protectors – Radar displays.

UNIT IV 9

Introduction: Introduction – Four methods of navigation.

Radio Direction Finding – The loop antenna – Loop input circuits – An aural null direction finder – The goniometer – Errors in direction finding – Adcock direction finders – Direction finding at very high frequencies – Automatic direction finders – The commutated aerial direction finder – Range and accuracy of direction finders

Radio Ranges – The Lf/Mf four course radio range – Vhf omni directional range (Vor) – Vor receiving equipment – Range and accuracy of Vor – Recent developments.

Hyperbolic Systems of Navigation (Loran and Decca) – Loran-A equipment – Range and precision of standard loran – Loran-C – The decca navigation system – Decca receivers – Range and accuracy of decca – The omega system

UNIT V

9

DME and TACAN – Distance measuring equipment – Operation of DME – TACAN – TACAN equipment

Aids to Approach and Landing – Instrument landing system – Ground controlled approach system – Microwave Landing System (MLS)

Doppler Navigation – The doppler effect – Beam configurations – Doppler frequency equations – Track stabilization – Doppler spectrum – Components of the doppler navigation system – Doppler range equation – Accuracy of doppler navigation systems.

Inertial Navigation – Principles of operation – Navigation over the earth – Components of an inertial navigation system – Earth coordinate mechanization – Strapped – Down systems – Accuracy of inertial navigation systems.

Satellite Navigation System – The transit system – Navstar Global Positioning System (GPS)

Total: 45

TEXTBOOK

1. Merrill I. Skolnik, “Introduction to Radar Systems”, 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.

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 – Helmholtz 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 electrodynamic microphone piezoelectric microphone – Calibration of receivers.

Total: 45

TEXT BOOK

1. Lawrence 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.

EC1015 – ROBOTICS

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UNIT IV ROBOT ORGANIZATION 9

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

UNIT IV 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 IV 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 IV 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

TEXT BOOKS

1. Koren, “Robotics for Engineers”, TMH International Company, 1995.
2. Vokopravotic, “Introduction to Robotics”, Springer, 1988.

REFERENCES

3. Rathmill, K., “Robot Technology and Application”, Springer, 1985.
4. Charniak and McDarmott, “Introduction to Artificial Intelligence”, TMH, 1986.
5. Fu, K.S., Gonzally, R.C. and 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.

CS1002 – DIGITAL IMAGE PROCESSING

(Common to CSE, ECE and IT)

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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 – Loeve transforms.

UNIT II IMAGE ENHANCEMENT TECHNIQUES 9

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

UNIT III IMAGE RESTORATION 9

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

UNIT IV IMAGE COMPRESSION 9

Lossless compression: variable length coding – LZW coding – Bit plane coding– Predictive coding– DPCM.

Lossy compression: transform Coding – Wavelet coding – Basics of image compression standards: JPEG, MPEG – Basics of vector quantization.

UNIT V IMAGE SEGMENTATION AND REPRESENTATION 9

Edge detection – Thresholding – Region based segmentation – Boundary representation: Chain codes– Polygonal approximation – Boundary segments – Boundary descriptors: Simple descriptors– Fourier descriptors – Regional descriptors – Simple descriptors– Texture.

Total: 45

TEXT BOOKS

1. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, 2nd Edition, Pearson Education, 2003.
2. William K. Pratt, “Digital Image Processing”, John Willey, 2001.

REFERENCES

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

CS1028 – 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 AND GEOLOCATION 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 and Prashant Krishnamoorthy., “Principles of Wireless Networks, – A United Approach”, Pearson Education, 2002.
2. Jochen Schiller., “Mobile Communications”, Person Education, 2nd Edition, 2003.

REFERENCES

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

CS1029 – 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 – Key management – 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 BOOKS

1. William Stallings, “Cryptography and Network Security – Principles and Practices”, 3rd Edition, Pearson Education, 2003.
2. Atul Kahate, “Cryptography and Network Security”, 2nd Edition, TMH, 2007.

REFERENCES

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

GE1001 – INTELLECTUAL PROPERTY RIGHTS

(Common to Biomedical and ECE)

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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 BOOKS

1. Subbaram N.R., “Handbook of Indian Patent Law and Practice”, S. Viswanathan Printers And Publishers Pvt. Ltd., 1998.
2. Eli Whitney., United States Patent Number: 72x, Cotton Gin, 2009.

REFERENCES

1. “Intellectual Property Today”, Volume 8, No. 5, 2001, [www.iptoday.com].
2. “Using the Internet for Non-Patent Prior Art Searches”, Derwent Ip Matters, July 2000. [www.ipmatters.net/features/000707_gibbs.html.]

GE1002 – INDIAN CONSTITUTION AND SOCIETY

(Common to Biomedical and ECE)

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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; Caste, religion, language in India; Constitutional remedies for citizens – Political parties and pressure groups; Right of women, children and scheduled castes and scheduled tribes and other weaker sections.

Total: 45

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, and 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 Change in India”, Manohar, 1997