UNIVERSITY OF PUNE

E & TC BE Syllabus

Part-I

Sub.No.	Subject	Teaching Scheme L/W	Teaching Scheme P/W	Examination Scheme P	Examination Scheme T/W	Examination Scheme Pr.	Examination Scheme Oral	Marks Total
404181	Computer Architecture	4	--	100	--	--	--	100
404182	Radiation and Microwave Techniques	4	2	100	50	--	--	150
404183	Digital Signal Processing	4	2	100	--	--	50	150
404184	Telepathic	4	--	100	--	--	--	100
404185	Elective-I	4	2	100	25	50	--	175
404186	Electronic Design and Software Techniques	2	2	--	50	--	50	100
404187	Project**	4	2	100	--	50	--	150
Total		22	10	500	125	50	100	775

404185 Elective - I
i) Audio Video Engg ii) Advanced Power Electronics iii) Systems Programming iv) VLSI Design v) Robotics vi) Information Technology
** Exam at the end of II term.

Part-II

Sub.No.	Subject	Teaching Scheme L/W	Teaching Scheme P/W	Examination Scheme P	Examination Scheme T/W	Examination Scheme Pr.	Examination Scheme Oral	Marks Total
404188	Communication Network	4	2	100	50	--	--	150
404189	Consumer Electronics	4	--	100	--	--	--	150
404190	Electronics Measurement	4	2	100	--	50	--	150
404191	Elective-II	4	2	100	--	50	--	150
404187	Project**	4	2	100	25	50	--	175
Total		16	12	400	175	100	50	725

Elective - II
i) Fiber Optic Comm. ii) Agriculture Electronics iii) Microwave Engg iv) Software Engg. v) PLC & Industrial Controllers vi) Image Processing
** Exam at the end of second term.

404181: COMPUTER ARCHITECTURE

Teaching Scheme: Exam. Scheme :
Lecturers: 4 Hrs/week Paper: 100Marks

1. Introduction to Parallel Computer Models: Multiprocessor & Multicomputers, SIMD, MIMD Computers, Pipeline Computers, Vector & Array Computers.

2. Architectural Development: Multiprocessor, Multivector, Multithreaded, Data flow tracks.

3.Program & Network Properties : Condition of Parallelism, System interconnect.

4. Advanced Processor Technology: Design of Processor.

5. Instruction Set Architecture: CISC, RISC, Scalar Processor, Super Scalar & Vector Processor .

6. Virtual Memory Technology: Virtual Memory Models, TLB, Paging and Segmentation.

7. Cache Memory Management: Mapping Methods, Cache Performance, Coherence, Shared Memory Organizations.

8. Pipelining & Super Scalar Technique: Clock, Timing Speedup, Throughput, Reservation & Hazards in Pipelines, Instruction Pipeline Design, Arithmetic Pipeline, Super Scalar Design.

9. Multiprocessor & Multi Concepts: MultiVector & SIMD Computers, Interconnect, Networks (In brief), Message passing & Multithread Concepts.

Reference Books

1. Richard Y.Kain- Advanced Computer Architecture- .PHI
2. Kai Hawang- Advanced Computer Architecture- MGH
3. Danniel Tabak- Advanced Computer Architecture
4. RISC, CISC Reference Manual

404182 : RADIATION AND MICROWAVE TECHNIQUES

Teaching Scheme:	Examination Scheme :
Lectures/Week : 4 Hrs	Paper: 100 Marks
Practicals/Week : 2 Hrs	Termwork : 50 Marks

1. Waveguides: Rectangular, modes of propagation in Waveguides. Waveguide parameters, Analysis and measurement, losses in waveguides. Application of waveguides, Cavity resonator, Analysis and measurement of its parameters, Application of Reentrant cavities, Coupling of cavities, Comparison of waveguides and co-axial cables, Excitation in waveguides.

2. Microwave Components: Principle of S- parameters, waveguide TEEs, Directional Couplers, Waveguide joints, bends, corners, twists, coupling probes and coupling loops, Waveguide termination, Ferrite devices for microwave applications, Circulators, isolators, Microwave Filters, Microwave attenuators, Slotted line, iris, tuners etc.

3. Microwave tubes & circuits: High frequency limitations of conventional tubes, magnetron. Principle of operation, construction, characteristics, parameters with analytical treatment wherever possible; Applications as amplifiers, oscillators, modulators, demodulators wherever applicable.

4. Solid state Microwave Devices : Microwave transistors, MOSFET & Varactor diodes, Parametric amplifiers, PIN diodes, Schottkey Barrier diodes, Tunnel diodes, Transferred Electron devices: GUNN diode, Avalanche MASERS, Transit Time devices like IMPATT, TRAPATT , BARRIPT diodes, Principle of operation, construction, characteristics, parameters with analytical treatment wherever possible, Application as amplifiers, Oscillators, Modulators, Demodulators wherever applicable.

5. Microwave measurements: Frequency, power, attenuation, phase shift, VSWR, impedance, insertion loss, dielectric constant, noise factor, Q of a cavity resonator.

6. Microwave Integrated circuits: Planar transmission lines like strip lines microstriplines.

7. Antennas : Review of dipole, monopoles, arrays, parasitic antenna, antenna feeding, antenna parameters & antenna measurements, wide-band antenna, microwave antenna like horns, parabolic reflectors, lens antenna, slot antennas, with reference to principle of operation, construction, feeding, parameters, measurement techniques with the help of analytical treatment wherever possible, application both as transmitting and receiving modes. Microstrip antennas: Principle of operation, methods of analysis, polarization, dual frequency microstrip antenna, microstrip arrays, feeding methods, application of microstrip antenna.

8. Radar Communication: Principle, block diagram, classification, radar range equation, Pulsed radar system, radar receivers, radar modulators, radar display, scanning & tracking, Doppler radar MTI radar, radio navigational aids such as LOS, ILS.

9. Industrial Applications Of Microwaves: Industrial control & measurement, Doppler

motion sensors, microwave heating etc.

Reference Books

1. RE Collin Mccornt- Foundation of microwave.
2. Liao Microwave devices and circuits- Prentice Hall India.
3. Sisodi Raghuvanshi-Passive microwave circuits- Willey Eastern.
4. Sisodia, Raghuvanshi- Basic laboratory microwave techniques microwave techniques and laboratory manual Willey Eastern. 5. K C Gupta - Microwaves
6. M.kulkarni- Microwave and radar Engg.
7. Collin-Antennas and wave propagation-McGraw Hill
8. Kennedy-Electronic communication systems- McGraw Hill

List of Practicals

1.Study of Reflex Klystron as source of microwave power in laboratory, sketching its modes, measurement of frequency, Mechanical & electronic tuning. Calculation of Q of cavity resonator.

2. Study of Gunn Diode & PIN modulator, as a source of microwave power, effect of variation of bias on frequency and power.

3. Study of characteristics of microwave Tees-E-plane, H-plane and Magic tee, power splitting and combination measurements, calculation of S-parameters, isolations and coupling factors.

4. Study of characteristics of directional coupler for various coupling factors, calculation of directivity, isolation etc.

5. Study of characteristics of Horn antenna, its radiation pattern, receiving pattern, calculation of antenna gain and beam width.

6. Measurement of VSWR for various values of termination (impedance) using slotted line. Calculation of characteristics Impedance of waveguide using Smith chart. Calibration of attenuator .

7. Study of characteristics of Isolator and Circulator.

8. Microwave power (Low/High) measurement.
OR

8. Study of Network Analyser for characterization of typical multiport microwave circuit.

404183: DIGITAL SIGNAL PROCESSING

Teaching Scheme:	Examination Scheme:
Lectures/Week : 4 Hrs	Paper: 100 Marks
Practicals/W eek : 2 Hrs	Oral: 50 Marks

1. Digital against analog processing, Application of DSP , Technology review, Application of DSP in speech processing, biomedical engineering, vibration analysis, picture (image) processing (case studies).

2. The Z-transform and its inverse, systems function, poles and Zeros, discrete time signals and systems, Generation of discrete time signals, properties and algebraic manipulation, Sampling theorem ADC, DAC, Difference equations, Representation of Discrete System via difference equation, Convolutions (linear and circular). Linear time invariant system, Casualty, Stability.

3. Digital filter structure, describing equation, system transfer function, filter catagories, direct form I & II structures, cascade combination of second order section, parallel combination of second order sections, FIR filter structure, frequency sampling structure of FIR filters, lattice-ladder structure.

4. Definition and properties of Discrete Fourier Transform, Fast Fourier Transform, Decimation in frequency, Decimation in time, GOETZEL algorithm, Chirp-z- transform algorithm, use of FFT algorithm in linear filtering and correlation, quantization effect of FFT , Frequency analysis of discrete time signals, power density, energy density, discrete time aperiodic signals its energy density, convergence effect.

5. Filter Design: Design of linear phase FIR filters using windows, rectangular windows, Gibb's phenomenon, Triangular window, Hamming window, Blackman window, Kaiser window, Hanning window. Design of linear-phase FIR filters using frequency sampling, design of optimum equiripple linear phase FIR filters, FIR differenciators, design of Hilbert transforms, Comparision of design methods. IIR filters: Design of IIR filters from analog filters, approximation of derivatives, Impluse invariance, Bilinear transform, Least square filter design.

6. Hardware architecture of DSP : Study of DSP chip architecture as an examples: (chip of Texas instruments or analog devices) Features of DSP chip architecture and instructions, comparison with microprocessor chip.

7. Analysis of finite word: length effects. The quantization process & errors analysis of coefficients, quantization , effects in FIR filters, AID conversion noise analysis, Analysis of arithmetic round effect errors. Dynamic range scaling, low sensitivity digital filters, reduction of product round off errors, limit cycles in IIR filters, round-off errors in FFT algorithms.

8. Applications: Dual -tone multiply signal detection, spectral analysis using DFT, short term DFTI, musical sound processing, voice privacy, sub band coding of speech & special audio signals, over sampling D\A, over sampling A/D, Applications of Multirate signal processing.

Reference Books

1. Proakis & Monaklis,"Digital Signal processing" Third edition, Prentice Hall,
2. S.K.Mitra,"Digital Signal Processing, A Computer Based Approach " TMH, 1998

List of Practicals

1. Floating point calculations of real and complex functions.
2. Generate waveforms from algebraic formula.
3. IIR filter design by Butterworth/Chebyshev and conversion into digital via Bi-linear transformation.
4. Computer discrete Fourier Transform of a signal.
5. Implementation of FFT algorithm.
6. Realization of Discrete transfer function.
7. Computing of linear & circular convolution.
8. FIR filter design using different windows.

404184 : TELEMATICS

Teaching Scheme: Examination Scheme:
Lectures/Week: 4 Hrs Paper: 100 Marks

1. Introduction to Telephone Networks, Basic component of Telephone network. Components of subscriber Telephone Instruments. Principles of push button dialer, DTMF dialer, cordless Telephone. Signalling tones. Principles of Manual & Automatic switching.

2. Concept of Automatic switching, Step by step switching. Principles of common control systems, Crossbar Exchange.

3. Electronic Exchanges-Stored Program Control, Architectural Features to ensure reliability, Load on processor, Availability of single processor & dual processor system, Centralized & Distributed configuration for SPC Exchange, Software Architecture, Various processes & priority levels, Application Software & enhanced services, Study of typical C- DOT 128 P system architecture, features & Functional description.

4. Single state & multistage switching network. Blocking Probability. Lee's model to evaluate blocking probability of three stage network. Concept of Time division time switching, Time division space switching, Time multiplexed time & space switching. Combination switch. ST, TS, STS, TST stages. Brief description of combination switching.

5. Traffic Engineering. Network traffic load & parameters, Grade of service & Blocking probability, Incoming traffic & service time characterization.

6. Subscriber loop systems, system hierarchy & Routing, Transmission systems & characteristics, Numbering & Charging Plan, Signaling techniques, Inchannel & common channel Signalling Trunk operation & Automatic Trunk Exchange.

7. Principles of data over Telephone network, Value added Services, Fax, E-MAIL etc.

8. Mobile Cellular Telephony-Need of Mobile Telephone, Limitations of conventional Mobile Telephone systems, Frequency band allocation, Trunking efficiency, Basic Cellular system components, Fading characteristics, Delay spread & coherence bandwidth, performance criteria, Basic operation of cellular system, Calculation of Maximum number of calls per hour per cell, Frequency channels per cell, Concept of Frequency Reuse schemes, Cell Splitting, Handoff Mechanism- Delayed Handoff, Forced Handoff, Mobile assisted Handoff, Cell site Handoff, Inter system Handoff, Concept of Dropped calls, Co-channel interference reduction factor, Analog Cellular switching system components, Introduction to Digital Cellular Telephone System, GSM system, GMSK Modulation Techniques for Mobile communication.

Reference Books

1. Vishwanathan- Telecommunications Switching systems & Network-PHI.
2. William LEE-Mobile Cellular Telecommunications- I PHI

404185: AUDIO-VIDEO ENGINEERING Elective- I

Teaching Scheme:	Examination Scheme:
Lectures/Week: 4 Hrs	Paper: 100 Marks
Practical/week: 2 Hrs	Practical: 50 Marks Termwork: 25 Marks

1. Properties of sound: Characteristics of human ear & vocal chord & his resemblance with microphones & loudspeakers- Types of microphones & detailed study of each type- Types of loudspeakers & enclosures & it's detailed study.

2. Different methods of sound recording & reproduction: (Analog & digital sound, Magnetic, optical & compact disk recording.) Materials & their properties used for S.R

3. Processing of sound signal: (balance, perspective, noise reduction techniques, amplification mixing, equalization-Detailed study of monophony, stereophony, pseudo- stereophony, Ambiophony & Quadraphony.

4. Room/studio acoustics: reverberation, echo, masking, shielding, placement of loudspeaker & microphones.

5. Basic television systems & scanning principles. TV I broadcasting-extended coverage-technology trends-CCTV's- broadcast information services-HDTV- Digital TV.

6. Color television systems & signals: Color fundamentals-mixing of colors & color perception- chromaticity diagram-color TV camera-Color TV signals & their transmission-NTSC, PAL, SECAM systems.

7. Studio equipment organization & control, TV studios- PCR facilities-MCR equipment- Telecine, TV recording systems.

8. Color TV transmission systems: Design principle of TV transmitters, Block diagram, Transmitting antennas, Microwave TV relay system, TV via satellite.

9. Propagation of TV signals & antenna systems, Propagation phenomena, Shadow zones, co-channel interface, Ghost images.

10 Broadcast colour TV receiver (IC ccts) -Block schematic & functional requirements-Different IC's used-Digital color TV receiver-specifications for color TV receiver Remote control.

11. Broadcast information services: Videotext, viewdata, teletext, viewdata, CRT displays, CRT controllers, standard graphic display adapters for PCs.

12. Advanced TV systems: digital TV, MAC signals HDTV, MUSE system, 3-D.

13. Study of Wobbulator, pattern generator, field- strength meter (Only block diagrams & operating principle.

Reference Books

1. A.M.Dhake- Television and Video Engineering.- TMH
2. Treman : Audio Encydopaedia
3. S.P .Bali-Color Television Theory & Practice -TMH
4. R.C. Gupta: Audio Video Engineering system: TMH
5. Grob & Hemdon: Basic Television and Video system, sixth edition,

List of Practicals

1. To measure sensitivity of microphones using reciprocity method (at least three different microphones)
2. To plot & study directional pattern of microphones. (Omni, Uni, & bidirectional)
3. Audio Signal Processing using graphic equalizers & active tone control circuits.
4. Frequency response of loudspeaker with & without enclosure.
5. Signal tracing of color TV receiver.
6. Directional pattern & gain measurement of Yagi antenna. Effect of no of directors on gain.)
7. Alignment of TV monitor using pattern generator.
8. Signal tracing of remote control for colour TV receiver.
9. Study of VCR (Recording & reproduction).
10. Study of one audio system in detail.

404185 : ADVANCED POWER ELECTRONICS Elective-I

Teaching Scheme:	Examination Scheme:
Lectures/Week : 4 Hrs	Paper: 100 Marks
Practicals/Week : 2 Hrs	Practical: 50 Marks Termwork:25Marks

1. Three Phase Converters: Operation, Overlap, Power factor, Equations for p-pulse converter.

2. Inverters:
i) 6 step 120 &180 mode of operation, load equivalent circuits for balanced R Load, harmonic content of phase and line output voltages.
ii) PWM Inverters SMM, MMSR, and Sinusoidal PWM inverters and their comparisons.
iii) Current Source Inverters
a) Single phase CSI with L Load; no overlap, partial overlap and full overlap regions of perations.
b) Three phase ASCSI with induction motor-load; analysis of no-overlap region.

3. Resonant Coverters :
a) Need of Resonant Converters, advantages of ZVS, ZCS, Switching trajectory and SOAR.
b) Load resonant converter Series loaded resonant half-bridge DC-DC converter and Parallel loaded resonant half-bridge DC-DC Converter.Comparison of SLR & PLR.

4. SMPS (Switched Mode Poer Supplies) :
a) SMPS versus linear power supplies; PWM control of output voltage; Multiple Output Supplies.
b) Minimumn load current and critical inductance considerance consideration, filter component selection and freewheeling diode for non-isloated buck converter.
c) Analysis of Isolated SMPS
i) Forward converter
ii) Flyback converter
d) Design of Switching regulator using IC like LM 105/ LM 305.
e) Modeling and Simulation of SMPS given in (b).
f) EMI/EMC concept and techniques for SMPS.

5. UPS (Uninterruptible Power Supplies)
a) Need for UPS, types of Mains pollution, concept of on line and off line UPS.
b) Detail study of blocks of UPS system
C) Calculation of battery V A ratings, charger and " inverter ratings and back-up times.

6. DC Motor control:
a) Quadrant operations: forward and reverse motoring, forward & reverse braking, regenerative and dynamic braking and plugging.
b) Constant torque and constant power methods of speed control.
c) Types of power converters:
i) Single phase half controlled line commutated converters.
ii) Single and three phase dual converter; circulating and noncirculating converter based on control voltage, load current or both, speed reversal trajectory, dual mode dual converter.
iii) Type A (step-down I quadrant), Type B (step- up I quadrant), Type C (2

quandrant), Type E (4 quadrant), choppers. Regenerative, dynamic breaking using choppers. Unipolar and bipolar modulation in Type E .choppers, multiplem chopper configuration for Type A choppers.
d) Close loop control of D C motors :
i) Double loop control, single loop control with current limit, need for RAMP generator/Double integrator for speed reference.
ii) Implementation using analog (OP AMP) circuits and using microprocessors, advantage and drawbacks.
iii) DC current sensing and speed measurement techniques:
e) Brushless DC motors: Types of motors speed control of brusheless DC motots, important features and applications.

7. Three Phase Induction Motor Control:
a) Constant V/F operation :
i) Variable frequency PWM-VSI drives, diagram,speed control method, current limiting,slip compensation.
ii) Variable frequency square wave (6 step) V SI drives, block diagram, speed, control method, output voltage and power factor variation.
b) Line frequency stator voltage control, rotor resistance speed control
c) Flux Vector Control Technique, Four quadrant reversible regenerative vector drive.
d) Breaking Mechanism of Induction Motor.

8. PM stepper motor drive : Unipolar, bipolar, half step control. Stepper motor control using dedicated IC's and chopper. Microprocessor based stepper motor control.

Reference Books
I. Cyril W.Lander-Power Electronics-McGrow-Hill
2. Dubey, Doralda, Joshi, Sinha- Thyristoried Power Controller's-New Age Intermational Ltd.
3. Mohan, Undeland & Robbins-Power Electronics-John Wiley & Sons
4. P .C. Sen- Thyristor D C Drives-John Wiley & Sons
5. Vedam Subrahmanyam-Electric Drives-Tata McGrow. Hills (Delhi)
6. Murphy & Tumbull-Power Electronic Control of AC " Motors- Macmillan Ltd.
7. G.K. Dubey-Power Semiconductor Controlled drives- Prentice hall lntermational.
8. P .C.Sen-Modem Power Electronics- Wheelers Publishing
9. H.D.Singh- Power Electronics- TMH

List of Practicals

1. Converters: To plot firing angle versus output voltage and to find out regulation of three phase half and fully controlled converters. To study microprocessor based system for controlling three phase controlled converters. To find out overlap angle for various source inductance and tostudy inverter operation of signal phase LCC.

2. To plot frequency versus RPM for PWM VSI fed signal phase induction motor.
OR

2. Time ratio versus output and regualtion of high power chopper.

3. To plot torque speed characteristic for V/F constant IGBT/MOSFET based three phase PWM VSI fed induction motor drive and to observe different wave forms.
OR

3. To study IGBT/MOSFET/BJT based three phase CSI inverter

4. DC motor drive: To find out regulation in I st and 3rd quadrant for microprocessor based DC drive. To study acceleration and deceleration in microprocessor based DC drive.
OR

4. DC motor drive: To observe and study regeneration in 2nd and 4th quandrant for microprocessor based DC drives. To study inching and crawling in 2nd and 4th quadrant for microprocessor based DC drives.

5. Reversible four quandrant flux vector control drive for induction motor.

6. Study of various paramenters of SMPS and UPS. Modeling and Simulation of SMPS.

7. Measurement of voltage, current,power, PF of converter ,output and inverter output using digital power meter.

8. Software development: To control speed of DC motor. To generate control waveform for three phase PWM inverter

404185 : SYSTEM PROGRAMMING Elective-1

Teaching Scheme:	Examination Scheme:
Lectures/Week: 4 Hrs	Paper: 100 Marks
Practicals/Week: 2 Hrs	Practical: 50 Marks Termwork:25 Mark

1. Concept of stacks & queues using linked lists. Polish expressions.

2. Assemblers : Tasks, syntax, literal, forward reference handing. Special directives and handing of directives. Data structures used. Design issues like table management techniques, listing & error indication. Design of One pass and assembler.

3. Preprocessor and Macroprocessor: Comparison with . Function, Macro definitions,. data structures used.

4. Linking & loading: allocation, relocation, linking, loading, various schemes of linking and loading, absolute & relocatable loader concept of binding, static & dynamic linking. BSS loader, COM & EXE files, overlay structures.

5. Overview of compilation, phases of compiler, types of compilers, lexical analysis, representation of tokens, Regular expression, NFA, DFA, Block schematic of lexical analyzer, design of a lexical analyzer for subset of 'C' Introduction of LEX.

6. Parser-Parsing techniques: Top down and bottom up programming language grammer, representation and types of grammer, recursive descent & shift reduce parser, design of a parser for subset of 'C' (construction of parsing table not essential). Introduction of YACC.

7. Intermediate code generation & optimization. Type of intermediate code forms.

8.Editors: Line, window, screen editors, Stream and structured editors, design and implementation issues.

9. Debuggers: Features of a debugger, MS-DOS debug.

Reference Books

1. Introduction to system software -Dhamdhere(TMH)
2. Principles of compiler design -Aho, Unman & Sethi
3. System Software -Beck

List of Practicals

1. Stack/queue using Linked list (Any other application of Linked list 2. Conversion from infix to prefix/postfix.
OR

2. Conversion from prefix/postfix to infix.

3. Building a tree and tree traversal.

4. Design of 2-Pass assembler for hypothetical machine
OR

4. 8085 micro processor, in C/C++.

5. Design of macroprocessor [Nested macro call within definition] in C/C++.

6. Design of line editor in C/C ++. OR

6. Design of screen editor in C/C ++.

7. Design of lexical analyzer for subset of Pascal/C by using C/C ++.

8. Design of Recursive Descent parser for a subset of Pascal/C by using C/C ++. ,

404185 : VLSI DESIGN Elective-1

Teaching Scheme: Examination Scheme :
Lectures/Week : 4 Hrs Paper: 100 Marks
Practicals/Week : 2 Hrs Practical: 50 Marks Termwork : 25 Mark

1. Finite state Machines : Moor and Mealay machines, Synchronous controllers, Timing consideration,control using PLA/EPROM, CPLDs and FPGA's.

2. VHDL:
a) Overview of design automation approach to digital design-use of Hardware Description languagages.
b) Structure ofVHDL, timing and concurrency issues, structural specification of hardware, wiring and component interconnections.
c) Definition and Usage of packages and components. Design of a general purpose Test Bench. Use of design library management. Introduction to Library STD Logic 1164 and multivalued logic.
d) Behavioural descriptions of hardware Syntax and Semantics for various forms and constructs.
e) Synthesis and design implementation, with case studies using download facilities at minimum 4 MHz, into CPLD 9500 series and FPGA 5200 or 4000 series with 7 - Segment display on board to verify results. With different configuration modes. f) Architecture of FPGA & CPLD such as Xilinx 9500 series CPLDS and 5200 or 4000 series FPGA's.

3. Advanced Topics :
a) Information on a complete tool from design entry to place and route.
b) Introduction to various industry standard tools used for simulation and synthesis.

4. VLSI Design Issues : Digital MOS ICS-D.C. analysis of inverter/Basic gates, concept of minimum logic levels, noise margins & delay calculations.

Reference Books
1. Digital design-M.Morris Mano;.2nd edition EEE-pm.
2. VHDL : Douglas perry : Third edition-MGH.
3. VHHL Analysis and Modeling of Digital systems-Z Navabi-McGraw Hill,- 2nd edition.
4. VHDL Techniques, Experiments and Caveats-by Joseph Pick,-McGraw Hill
5. Principles of CMOS VLSI design-Neil & Kamran- Addison Wesley.
6. Xilinx Manual. List of Practicals Software: using XILINX S/W version 1.5 or similar. Hardware: using FPGA and CPLD. Laboratory requirement: 5-Pentium computers, Windows based, preferably with LAN.
a) Experiments Based On Combinational Logic

1. Simulation and Implementation of BCD to 7 - Segment Display Decoder.

2. Simulation and Implementation of Magnitude Comparators.

3. Simulation and Implementation of ALU with minimum 4-Arithmatic/Logical operations[e.g. IC 74181].

b) Experiments Based on Sequential Logic [Any Two]

1. Simulation and Implementation of Latches and Registers with Reset and Clear.

2. Simulation and Implementation of Counters.

3. Simulation and Implementation of Shift Registers.

c) Complex & Advanced Experiments [Any Two]

1. Simulation and Implementation of Functionally of 8253 [Programmable Timer or Counter].

2. Simulation and Implementation of Functionality of 8255 [PPI].

3. Simulation and Implementation of a Bit programmable Input/Output, [6821].

404185 : ROBOTICS Elective-1

Teaching Scheme: Examination Scheme:
Lectures/Week: 4 Hrs Paper: 100 Marks
Practicals/Week: 2 Hrs Practical: 50 Marks Termwork: 25 Mark

1. Introduction: Automation and robotics, classification of robots based on co-ordinate system, robot specifications.

2. Mechanical systems : Components of robot-Manipulator, controller, power conversion units etc., Motion conversion Rotary to rotary , Rotary to linear .

3. Manipulator dynamical modeling and manipulator controller. Dynamical model in Newton-Euler form for two links, State variable representation of dynamical model, Linearization of dynamical model. Controller design for manipulator gross motion, Primary and secondary controller, optimum controller.

4. Transformation and Kinematics: Homogeneous co- ordinate-vector operations, matrix operations, co-ordinate reference frames, Homogeneous transformation and manipulator orientation, relative points, reference frames, Forward solutions-Link co-ordinate frames, DH matrix. Inverse or back solutions-problem of obtaining inverse solution, techniques of using direct and geometric approach.

5. Robot actuators: DC servo motors, DC stepper motors, switched reluctance motors, Hydraulic & pneumatic actuators, proportional/directional servo valves.

6. Robot sensors: optical encoders, tactile sensors, force/ torque sensors, Vision sensors and systems position and proximity sensors

7. Robot motion planning: on-off trajectory , velocity and acceleration profile,Cartesian motion of manipulator, joint-interpolated control, Jacobian interms of D-H matrix

8. Robot programming: Fixed instruction sequence control Instruction to first generation programming languages

9. Application of Robots: loading, unloading, welding, spray painting, assembly, matching

Reference Books
1. R.D.Klafter & Thomons Chemielewski and Negin- Robotic Engineering-Prentice Hall
2. R.J.Schilling-Fundamental of Robotics-Prentice Hall
3. Fu,Lee and Gonzolez-Robotic Engineering-McGraw Hill

List of Practicals

1. Study of robot mechanical components-manipulator, end effector, link, joints

2. Motion of robot for each degree of freedom

3. Teaching a sequence to robot using teach pendant

4. Study of sensors used with robots (proximity, pressure, vision etc.)

5. Robot programming using control language

6. Study of robot drive OR 6. Robot path planning

7. Design of robot controller for two joint manipulator.

8. Study of pneumatic robot.

OR

8. Study of vision system for robot.

404185 / 404205 /404225: INFORMATION TECHNOLOGY

Teaching Scheme: Examination Scheme :
Lectures/Week: 4 Hrs Paper: 100 Marks
Practicals/Week: 2 Hrs Practical: 50 Marks Termwork: 25 Mark

1. Multimedia:

-1.1 Introduction MM Technology -Present scenario -Applications of MM -H/W devices used in MM -S/W used MM

-1.2 Multimedia Devices -Mass stroage devices, optical drive, magnetic drive, CDROM, DVD -Scanners different types -CCD types -Sound cards, Microphones, Modem, Sound & .display Adapters/Drivers.

-1.3 Multimedia software programming -Multimedia programming support in windows 0.5. -Communication application, Dial up network, sound editors, interactive voice response applications. -Remote- Video conferencing techniques -Graphics file formats. BMP, TIFF, GIF, JPEG, MP3 format. -Graphics packages, Image processing packages.

2. Introduction to embedded system software:

-2.1 Study of 0. W. used in small system devices i.e. PSOS, VxWorks

-2.2 Study of DOS kernel, device drivers, TSR's

3. Networking Devices :

-3.1 Study of networking devices Ethernet cards, HUB, Routers, Switches Bridges, Multiplexors, Gateways.

-3.2 Overview of Network systems., LAN/WAN, wireless LAN, SateIite networking, case study of existing LAN/WAN system, Inter drive provider setup. Exposure to VPN (Virtual Private LAN)

4. Business on the Internet :

-4.1 Neccesity of on line Business.

-4.2 Acceptable uses & custom of the Internet.

-4.3 E-business access control and security, case study : Firewall security.

-4.4 Business and professional Resources on the Internet : Business to Business and Business to customer.

-4.5 Your Business online now and in the future.

Reference Books
1. Ralf -Steinmetz Klara Nahrstedt, Multimedia Computing Communication applications- PH STR INNovating techniques series.
2. Jusith Jeffcoate, Multimedia in Practice: Technology and application PHI : 1998.
3. Michel J. Young, Windows Multimedia and animation with C++ programming for Windows 95.
4. Alitiken Jarol, Visual C++ Multimedia & windows set, Corioils Group Books.
5. ISDN & Bround Band-ISDN with frame relay & ATM-Willam Stallings.
6. ATM Networks, concepts protocols, application- Rainev Hancel, Manfrred N. Huber Stephe Schrodev- Addission Wissley.
7. A. Tannebanm-Computer Networks IInd III rd edition PHI.
8. High speed Networks Willam Stallings:
9. Principles of computer communication N/W design- J. Seidler Ellis Horwood.
10. Fast Ethernet- Johnson.
11. The new Interest Business Book -ELLSWORTH & ELLS WORTH- John Wiley 1996 publication

List of Practicals Group I: Multimedia Assignments.

1. Study of sound file formats, Wav, VOC. (Assignment should be framed on conversion, editing, and appending, above file formats) .

2. A law and μ law companding techniques (implementation on sound files)

3. Use of Multimedia library of implement general .announcement system. (Win dows 95, C/C ++, VC++ programmmg assignments).

4. Modem interface for Dial up data transfer-

5. Modem programming for incomming Tel. Dialed digit identification, switching into voice, answer machine configuration)

6. Use of 3D studio & features.

7. Study of graphics data file formats. BMP,TIFF, GIF (Assignments should be framed on image processing application like grey level, Histogram etc).

8. Image grabbing and processing using scanners or CCD camera. GP II : Network programming

1. Case study of existing network, study of network components & references.
2. Case study of interval- service providers set up.
3. Configuration and set up anyone of the following, Router, Proxy server, Web Server, Mail server.
4. Communication between PC's using Telnet, and data transfer using FTP .
5. Dial up networking using Modem.
6. Remote printing, shell access, login.

Any 5 from 1st group and any 3 from 2nd group. Note: Above list of assignments should be used as guidelines for framing the assignments. Latest Techniques should be incorporated using suitable software package/language.

404186: ELECTRONIC DESIGN AND SOFTWARE TECHNIQUE

Teaching Scheme:	Examination Scheme
Lectures/Week: 2Hrs	Termwork : 50Marks
PracticalsIWeek : 2Hrs	Oral: 50 Marks

1. System Design: Specification of Electronic system to be designed. Contraints related to environment. Industry standards, balancing overall tradeoffs between specifications and constraints. Chart schedule of losses needed in design.

2. Generating a possible concept of solution to the design problems partitioning the system into the fundamental modules. Specification of each module, .consideration of minimum independency with adjacent modules.

3. Detailed design of each module: Selection criteria, circuit design calculation, development of software by flowchart or by algorithmic techniques.

4. Integration of hardware and software technique into the total system. Documentation of each design should consist of verification techniques/comment on test. Block diagram and circuit diagram of each stage, choice of major components and ICs, Concise calculation of each stage, cost estimate, PCB layout, Mechanical and asthetic design aspects. Operating instructions and fault finding procedure.

5. Software Engineering: Importance of software, an industry perspective, software characteristics, components applications, generic view of software engineering. Software design, procedural design documentation.

6. Structral analysis and its extensions:Basic notation and its extensions.

7. Design and implementation of software : Design fundamental, abstractions, refinement modularity, software architecture control hierarchy, data structure, software procedure, information hiding.

8. Data flow oriented design: Design Information flow, Design process considerations transform flow, transaction flow.

Reference Books

1. Paul Horowitz & Wine Field Hill: Art of Electronics, Maxwell - IIIrd Edition
2. Comer: Digital Logic State Machine Design-Saunders College
3. Roger S.Pressman:Software Engineering-McGraw Hill
4. Z.Nawabi : VHDL Analysis. & Modelling of Digital Systems-McGraw Hill

List of Practical

Above mentioned aspects are to be incorporated in to the following design.

1. Design of test and measuring instruments

2. Design of communication system

3. Microprocessor/Micro controller/PC based board level system design

4. Digital design with state of art approach like ASM,FSM.

5. Computer aided Engineering design using VHDL/ Verilog Software or similar.

404187: PROJECT

Teaching Scheme: Examination Scheme :
Pract.: Term Work :100Marks 2 Hours / Week -I
Term Oral: 50 Marks 6 Hours / Week -11 Term ** Exam at the end of 2nd Term.

This will consist of a report based on : Laboratory work involving design and construction of electronic instrument or control or measurement system.

OR

Investigation of practical problems in manufacture and / or testing of electronic or communication equipment or components.

OR

Investigation of latest developments in specific field of electronic or communication of signal processing.

OR

Purely Hardware Project OR Microprocessor / Microcontroller / PC Based Project preferably Hardware and Software combination OR Software development project related to VHDL / Electronics communication / Process Instrumentation f Information Technology / Power Electronic / Digital Signal Processing / Agricultural Electronics with justification for techniques used/implemented with enough complexity involved to compensate Hardware related work. The project work will be carried out by the student individually or by a group of students not exceeding three depending on complexity of the project. Students should maintain a log-book of the work done for the project which should be produced at the time of examination along with the bound project report in a specified format at the time of examination students will have to demonstrate working of the project carried out by them during the year.

404188: COMMUNICATION NETWORKS

Teaching Scheme:	Examination Scheme:
Lectures/Week : 4 Hrs	Paper: 100 Marks
Practicals/Week : 2Hrs	Teamwork : 50 Marks

1. Introduction of Communication Networks: Types of networks, centralised & distributed data networks, voice networks, integrated network, local area networks, wide area networks, wireles networks, Internet, Network design issues like protocol hierarchies, layered architecture, interfaces and services, Service primitives and relationship of services to protocols, Network topology design & algorithms, Reference models and their comparison, Examples of data communication services like SMDS, X.25 networks, Frame relay, Broadband ISDN & A TM in brief.

2. Brief overview of physical layers : transmission media like twisted pair, co-axial cable, fiber optics, radio microwave transmission. geosynchronous,LEO MEO satellite etc.

3. Data link layer design issues: Framing, error control, flow control, Simplex stop & wait protocol, sliding window protocol, HDLC, data link layer in Internet & ATM.

4. Medium Access Technique: Static & dynamic channel allocation in LAN's & WAN CSMA CD protocol, WDMA protocol, IEEE 802 Standards for Ethernet, token bus, token-ring, distributed queue, dual bus, logic link control, bridges, High speed LAN's like FDDI.

5. Network layer & design issues: Internal organization, virtual circuit protocol & datagram, Routing & Congestion control algorithms, Internet IP protocol & address, ICMP, ARP , RARP , IP on demand, OSPF & BOP, CIDR & .lPV6.

6. Transport layer: transport protocols, addressing, establishing & releasing connections, transport protocol for Internet-TCP& UDP.

7. Network Applications, Security & Management : Security issues, Cryptography, secret key and public key algorithm, authentication protocols, DNS, SNMP , World Wide Web -Client & Server site, Writing a Web Page in HTML, Concept of Socket programming for client server, JA VA, Remote Login, TELNET etc.

8. Analysis of loss and delay in Networks: Queuing Theory, M/M/I queue, Modeling network as graph,fundamental graph algorithms, tree in graph, maximum spanning tree.

Reference Books

1. A. Tanenbaum -Computer Network 2nd Edition -PHI
2. A. Tanenbaum -Computer Network 3rD Edition -PHI
3. Aaron Kershenbaum -Telecommunication Networks Design Algorithms -MGH
4. S. Keshav -An Engineering Approach to Computer Networks -PHI
5. Williams Stallings -Data Computer Communications -PHI
6. Uyless Black -Data Communication And Distributed Network -pm

List of Practicals

I. Study of Network Components like cables, connectors, switches, Hubs, bridges, routers, gateways, (physical 72 University of Pune components or S/W module overview) Installation and configuration of Network interface card within computers and connecting two machines on windows / Novelle Net ware / Unix.

2. To establish INTERNET connectivity using dial up ntodem on windows f Unix systems and configuration of same machine as a proxy server for WWW . 3. Configuration for domain name server for an Institution / Organisation having different subdomains, on Unix / Windows machine.

OR

3. Configuration of main server for an Institution / Organisation, using Unix machines.

4. Implementation of socket programming concept for client server application using C / JAVA.

5. Implementation of sharing the disk resources (HDD / CDROM) on a Windows system b) UNIX system (NFS)

6. Study of Network applications like TELNET, FTP, Remote Login secured / unsecured) OR

6. Installation of a package to monitor the Network for various attributes (e.g. Load on Network, Load on Web server etc.) and finding out the attributes for a typical network.

7. To write a 'C' program for implementation of shortest path routing algorithm.

8. To write a 'C' program for implementation for public / private key algorithm (e.g. RSA algorithm) for encryption / decryption.

9. To write a 'C' code for an application like ring or Telnet or Remote Login.

404189: CONSUMER ELECTRONICS

Teaching Scheme: Examination Scheme:
Lectures/Week: 4 Hrs Paper: 100 Marks

1. Sound recording & reproduction: Analog & digital sound recording & reproduction. Principles & block schematics of optical recording, magnetic recording and compact disk recording systems.

2. Audio amplifiers mono and stereo and their subsystems: Features of Hi -Fi sound, Audio mixers, graphic equalizers, tuners, public address systems, cassette deck CD player.

3. Principles of colour television: Transmission standards, colour fundamentals, Hue, Saturation. Block diagrams of colour -transmitters and receivers, Features of current colour TV technology.

4. Video recording: Video cameras: different types and;. principles of operation. Principles of video recording and block diagram of VCR & its features. Video display Units-Monitors LCD displays, Plasma displays & .CCTV system.

5. Principles of HDTV & Its transmission standards.

6. Modern home appliances with electronic control, Microwave ovens, Remote controls, Security systems, Video games, Digital diaries, Musical instruments, Washing machines, Cam coders, Cellular phones, papers, fax, wireless phones, Digital calculators, thermometers. B. P. meters, Electronic weighing systems. (Principle of operation, block diagram & features of each)

7. Mass production techniques & consumer electronic product design features. 74 University of Pune

8. Multimedia Audio Video Standards

9. Internet Applications, Email, FTP. WWW.

10. Solar cells and panels.

References Books

1. A. M. Dhake -Television Engineering -TMH
2. Olson -High quality sound recording & reproduction
3. Phillips handbooks on Audio, Video and Consumer Electronics Application Notes.
4. S. P. Bali -Colour Television Theory & Practice -TMH

404190 : ELECTRONIC MEASUREMENTS

Teaching Scheme:	Examination Scheme
Theory/Week: 4 Hrs	Paper: 100 Marks
Practicals/W eek : 2 Hrs	Pract : 50 Marks

1. Principle of Measurement: Instrument classification, static / dynamic characteristic of instruments, instrument calibration standards, calibration methodology, validation, tracebility ,measurement, system errors -schematic, random and gross, statistical distribution functions, confidence in intervals, comparison of means statistics conditions of data, regression analysis.

2. Voltage, Current and Resistance measuring instruments: Measurement of voltage, current, resistance, inductance, capacitance and frequency with digital techniques, Sources of measurement errors. DMM, DVM, digital LCR meter, true RMS Voltmeter , Complex impedance measurement meters.

3. Oscilloscope: General oscilloscope concept, concept of bandwidth, triggering sources, Multitrace CRO technique, Plug -in units for CRO. Typical oscilloscopespecifications, High frequency and sampling CRO, power scope. Digital storage CRO, Block diagram, Acquisition methods, Enhance features, Automatic measurements, Oscilloscope probes -Attenuated, High impedance, active, differential, current and Hall effect probe.

4. Time and Frequency Measurement Techniques (Digital) : Time and frequency standards. Frequency period and ratio measurement, digital timer / counter plug-in modules for counter.

5. Signal sources: Kinds of signal waveforms. Standard signal generator, synthesized signal source, synthesized sweeper, programmable pulse generator, arbitrary waveform synthesizer.

6. Measuring Instruments : (Working principle, block diagram and applications) Wave analyzer, Total Harmonic Distortion analyzer, Spectrum analyzer, Digital FFT analyzer, Logic analyzer and Signature analyzer, Network analyzer and OTDR

7. Communication measurement: Selectivity, sensitivity measurement. Communication analyzer, Digital transmission analyzer, Case study -Digital radio test measurement like power, adjacent channel power, frequency occupied bandwidth, modulation occupancy.

8. Power Measurement Techniques: Audio, Radio, Microwave and Optical power measurement technique.

9. Automatic Test Equipments : Standard Instrument Buses -like IEEE 488, VXI. Analog and digital board testing setup. Computer based and computer control system. Case study -PC based instrument test system.

10. Guarding Techniques, Radiated and conducted measurement setup : EMI EMC standards such as IEC, VDE, FCC, CISPER, MIL.

Reference Books

1. Clyde F Coombs -Electronic Instrument Handbook -McGraw Hills
2. Alan s. Morris -Principles of Measurements & Instrumentation -PHI
3. A. J. Bouwens -Digital Instrumentation -McGraw Hill
4. Oliver Cage- Electronic Measurement -McGraw Hills
5. Stanlley Wolf, Smith -Students Reference Manual for Electronic Instrumentation. -PHI
6. Hewlett Packard, Tektronics, Advantest, Anritsu - Application Notes on measurement.

List of Practicals

1. L C Rand Q factor measurement of LF RF (upto 50 MHz) for discrete components & communication Cables(flat/Coaxial)
OR
Calibration of analog TVM DVM usingV / I sources.

2. Experiment on Statistical Analysis of Measurements.

3. To measure Conducted EMI for a given electronic equipment with reference to typical standards.

4. To calibrate an unknown Signal/function generation using universal HP counter for frequency period and ratio.

5. To study special features of HP Sampling DSO like storage, cursor measurements, zoom and mathematical abilities, transient or glitch capture, advanced trigger and sweep modes.

6. To measure THD & distortion factor meter / wave analyzer.

7.Analysis of waveform in time frequency domain using Analysing recorder / FFT analyser. OR Analysis of wave forms in frequency domain using spectrum analyzer and RF synthesizer source / sweeper {for sine, square, AM, PM, etc.)

8. Trouble shooting of microprocessor based system using logic analyzer.

9. Study of network analyzer for analyzing characteristics of typical two port microwave network / RF circuit / device OR Analysis of various real time communication signals using radio communication analyzer.

404191: FIBER OPTIC COMMUNICATION Elective -II

Teaching Scheme: Examination Scheme :
Lectures/Week: 4 Hrs Paper: 100 Marks
Practicals/W eek: 2 Hrs Practical: 50 Marks Termwork : 25 Marks

1.Elements of fiber optic communication system : Advantages & disadvantages of optical communication over other communication systems. Ray theory of transmission & concept of acceptance & numerical aperture from it." Wave theory of optical propagation. Cut off wavelength, group velocity & group delay.
Types of different fibers: according to materials used, according to refractive index profiles & according to the mode of transmission. Materials used to manufacture fibers, manufacturing methods & their relative study.
Fiber optic cables: Encapsulation, strength members, characteristics of materials for sheaths & other components, specific protection techniques, environmental effects & cable designing. Characteristics of optical fibers. Optical loss by attenuation (absorption, scattering & bending losses in core and cladding) Signal distortion in optical waveguides -Material dispersion, Waveguide dispersion, intermodal distortion, information capacity determination. Fiber optic splices, connectors & couplers. Coupling losses -Splices -Connectors -Directional Couplers ~ microlenses for coupling devices. Optical Sources - Wavelength considerations, Material considerations, Light emitting diodes~ Laser diodes & different modulation techniques. Optical detectors - Receivers, Noise consideration for photo detectors, their types, manufacturing methods & relative merits & demerits. Technology trends. Optical fiber measurements. Measurements of Attenuation, dispersion refractive index profile and numerical aperture optics systems design -Design consideration- Optical Power budgeting, rise time budget Digital fiber optic communication systems -analog fiber optic communication systems. Coherent optical fiber communication -Fundamental concept, homodyne & heterodyne detection. Advanced systems & techniques -Optical amplifiers, .integrated optics, wavelength division multiplexing Local area networks photonic switching, integrated optical switches. Non linear optical effects.

References Books
1. Optical fiber communication -G. Keiser (MH)

2. Optical fiber communication principle & practice -J . Senior (PH)

3. Fiber Optics Handbook for Engineers & Scientists - Fredrick C allard (MH international)

List of Practicals
1. Study of different light sources: LED (lambda = 800 . to 900 Dm, lambda = 1.2 to 1.3 micrometer, lambda = 1.55 micro meter) LD (lambda in any of the 3 windows) To plot V -I characteristic of one LED source To plot V -I characteristic of one LD source To plot optical characteristic Voltage optical power o/p of LED & LD source.

2. To measure the numerical aperture of a fiber with & without visible light source.

3. To measure the attenuation of optical fiber. (Length of fiber should be atleast 10 meters.)

4. Design build & test simple fiber optic link for transmission of analog signal.

5. Design build & test simple fiber optic link for transmission of digital signal.

6. Transmission of multiplexed signal through fiber optic link (use any method of modulation & time division multiplexing)

7. To establish a communication between two PC's using optical link. (Simplex and / or duplex.)

8. Frequency response of detector with different values of load resistor & to find optimum value of load resistor.

9. Demonstration of Splicing technique & connectorization technique & Measurement of splicing loss.

OR

9. Study of optical instruments such as optical power meter, Optical time domain reflectometer, Wavelength meter, Optical Spectrum analyzer etc. atleast two equipments should be covered.

404191 : AGRICULTURE ELECTRONICS Elective-II

Teaching Scheme: Examination Scheme :
Lectures/W eek : 4 Hrs Paper: 100 Marks
PracticalslWeek : 2 Hrs Termwork : 25 Marks Pract. : 50 Marks

I. Introduction: Need, Scope and applications. of electronics in field of agriculture, Basic physical principles of electronic measuring instruments used in agriculture, Factors influencing the growth of plants.

2. Soil science: Measurement of soil parameters such as .soil moisture, soil temperature, ion concentration, soil salinity, Methods for soil analysis.

3. Water management and irrigation: Instrumentation and controls for motors, motor pump sets, protection, circuits, solenoid valves, sprinklers and drip irrigation, Timers, On/Off, Sequential timers, programmable timers, and controllers (Microprocessor based).

4. Green house instrumentation: Green house technology introduction, instrumentation's required for tissue culture techniques. Use of simple electronic circuits for control for physical parameters like temperature, humidity and irrigation, Short rang remote sensing and indication of physical parameters.

5. Applications of electronic instrumentation in agriculture: Data logger, features of data loggers, data loggers for dedicated use in agriculture. Use of opto-electronic devices for measurement and control of physical parameters in agri-electronics, The sensors for moisture in grain storage structure, Soil, salinity tester, Specific ion analyzer, Field usable pH meter.

6. Non conventional Energy Sources: Energy requirement for agro-based product, solar energy . utilization, solar thermal and photovoltaic system, solar battery chargers and inverters for farm products, types of motor drives used in agriculture.

7. Dairy electronics: Milk tester computerized milking process, processing of milk, Digital weighing machine.

8. Troubleshooting and maintenance: Maintenance and troubleshooting of electronic instruments used in Agri-electronics and agro based industry .

Reference Books

1. Treatise on agro-Physis and agri-electronics, ed. By Dr. G. N. Achharya and Dr. D. G. Hapse, published by Vasantdada Sugar Institute, Manjri, Pune.
2. Micro climate by Shashi Venna, Rasenderg & Blad.
3. Ian. G. Walls -The Complete Book Of The Green House -Ward Lock Ltd. London.
4. Willard Merrit & Deon -Instrumental Methods For Analysis -McGraw Hill.
5. S. P. Sukhateme -Solar Energy.
6. Messel, H. Pergamon, Press -Solar Energy -MGH
7. Beyond -Agriculture Electronic -American Society of Agri. Engg. U.S.A.
8. yanden Berg -Agriculture Sensors -Agricultural Society of Agri. Engg. U.S.A. F. G.

Shinsky -pH and Ion Control Process and Waste Streams -Environmental Science and Technology.

List of Practicals

1. Digital weighing machine. OR

1. Protection and automation system for pump sets.

2. Wire less instrumentation like remote switch, PM transmitter.

3. Study of capacity measurement technique of moisture content in soil. OR Study of an electronic pH measurement system and calibration of pH amplifier.

4. Determination of turbidity and viscosity of solution (milk) using opto-electronics .

5. Study programming of general purpose data loggers.

6. Study of drip irrigation system using microprocessor.

7. Measurement of temp., humidity, leaf wetness by data loggers in agriculture field.

8. To design and build electronic liquid leveling instruments. OR

8.Measurement of liquid flow by opto-electronic flow meter technique.

404191: MICROWAVE ENGINEERING Elective- II

Teaching Scheme: Examination Scheme:
LecturesIW eek : 4 Hrs Paper: 100 Marks
PracticalslW eek: 2 Hrs Practical: 50 Marks Termwork : 25 Marks

1. Impedance Transformer and matching: Smith Chart, Impedance matching with reactive elements~ Double stub matching network, triple stub tuner, Impedance matching with Lumped elements, Design of complex impedance mismatch factor, Waveguide.reactive elements, Quarterwave transformer, Binomial .transformer, Chebyshev transformer, Tapered transmission lines.

2. Circuit Theory for Waveguiding system: N-Port Circuits, Two Port junctions, Scattering matrix fohnulation, Scattering matrix for a two port junction, Transmission matrix representation.

3. Passive MicrowaveDevices & Electromagnetic resonators. : Terminations, Attenuates, Phase shifters, Directional couplers, Hybrid junctions, Power dividers, Circulators, Microwave propagation in ferrite and faraday rotation, resonant circuits, Transmission line resonant circuit, Micro resonators, Dielectric resonators.

4. Periodic Structures and filters. : Capacitively loaded transmission line circuit analysis, wave analysis of periodic structure for TWT , Introduction to Microwave filters, Image parameter method of filter design, specification of power loss ratio, low pass filter design, Frequency transformation, Impedance and admittance inverters, microstrip half wave and parallel coupled filter, Quarter wave coupled and direct coupled cavity filter.

5. Microstrip design aspects : Microstrip Transmission line, Coupled Microstrip lines, Strip Transmission lines, Copkinar Transmission lines, Circular wave guide, Wave velocities, Ridge Wave guide, Fin line.

6. parametric Amplifiers: Microwave tubes, Solid state Amplifier, O-type TWT, M-type TWT, M-type TWT, BJT , PET, Microwave amplifier design using S-parameters, Amplifier power gain and stability criteria, Low noise .amplifier design,Microwave amplifier design,parametric amplifiers.

7. Oscillator and Mixers : Gunn oscillator, IMPATT Diodes, Transistor oscillator, Three -port description of Transistor oscillator circuits and design, Linear and non-linear Mixers, Mixer noise figure, Balanced Mixers, Mixer analysis using harmonic balancing.

8. Antennas : Linear wire antennas,Linear elements near or on infinite plane conductor, Ground effects, Loop antennas, Polygonal & ferrite loop Linear Planar and circular Arrays, Broadband Dipoles and matching techniques, traveling wave and Broadband .Antennas, Frequency Independent Antennas and Antenna miniaturization. Reflectors and antennas..

9. Laser and Maser: Theory and applications.

10. Microwave communication systems: Analog and digital microwave communication systems, LOS system, GTA system. Interference, damping duct propagation. Link calculation, noise consideration, Digital hierarchies, Bandwidth efficient digital radio system, Hybrid microwave systems.

11. Radar: Doppler, CW Doppler, MTI, FMCW radar, Radio navigation aids.

12. Microwave Frequencies and Microwave Applications: Industry (Food, Rubber, Chemical, Heating and Drying in Various Industries), Scientific (Satellite, Radio Navigation, Radio Astronomy, Remote Sensing, Particle Accelerators, Fusion, Spectroscopy, Space Craft and Missile and Echo Friendly Applications), Medical (Diagnosis, Monitoring and Treatment.)

Reference Books .

I. R. E. Collin -Foundation of Microwave Engineering, -McGraw Hills
2. Liao -Microwave Devices and Circuits. -PHI .
3. Sisodiya Raghuwanshi -Passive Microwave Circuits. -WileyEastera
4. Sisodiya & Raghuwanshi -Microwave Test Laboratory Measurement. -PHI
5.. Hewlett Packard Application Notes
6. Skolink -Radar Systems -McGraw Hills "

List of Practicals

I. Parameter measurements of a circular waveguide.

2. S. Parameter measurements of an active device.

3. Analysis of a typical two port microwave circuit for VSWR, reflection coefficient, ZO, S -parameters microwave network analyser.

4. PIN diode characteristics and applications.

5. Measurement on a microstrip antenna (primary parameters R, L, G, C, secondary parameters Zo and r.)

6. Budget calculation of a typical microwave link set up.

7. Study of typical. microwave amplifier and its Testing.

8. Typical Industrial applications of microwave such as non-destructive testing, Heating, Drying etc.

404191: SOFTWARE ENGINEERING Elective-II

Teaching Scheme:	Examination Scheme:
LectureslW eek : 4 Hrs	Paper: 100 Marks
Practicals/Week : 2 Hrs	Practical:50Marks Termwork : 25 Marks

I. Introduction to Software Engineering: What is Software Engineering? evolving role of software, software characteristics, components, applications. Software crisis and myths. Software Engineering - Process, Methods and Tools. Software process models, prototyping models, RAD model, evolutionary software process models, 4 GT's.

2. Managing Software Projects : Project management concepts, Software process and project metrics, software measurement,metrics for software quality .Software project planning, software scope, resources, software project estimation, decomposition techniques, empirical estimation models, the Make-Buy decision. Risk Management. Project scheduling and tracking, Software quality assurance, software configuration management.

3. Conventional methods for Software Engineering : Analysis concepts and Principles and Modeling : Requirement analysis, software prototyping, specification, Data modeling, functional modeling and information flow, Mechanics of structured analysis, Data dictionary . Design Concepts and Principles and Methods: The design process, principles and concepts. Effective modular design. The design model and design documentation. Data design, architectural design, procedural design, interface design. Software Testing methods and strategies: Testing fundamentals, White box, basis path, control structure, black box testing. Unit, intergration and validation testing, system .testing.

4. Object-oriented Software Engineering: The 00 .paradigm and concepts. Elements of object model. Object-Oriented Analysis: Conventional vs. 00, Domain analysis, OOA process, the Object-relationship model.
Object-Oriented Design: Conventional vs. 00, design issues and landscape, components of OOD, the system design and object design process.
Metrics for Object-oriented systems: The intent of 00 metrics,class-oriented and operation-oriented metrics.

5. .Advanced topics in Software Engineering: Software Reuse: Management issues, the reuse process, building reusable components, classifying and retrieving components. Reengineering : Software reengineering, reverse engineering, restructuring Client-Server Software Engineering: The structure of client-server systems, software engineering for C/S systems, analysis and design for C/S systems.

Reference Books
I) Roger S. Pressman: "Software Engineering: A practitioner's approach", Fourth Ed., McGraw-Hill International Editions, Software Engineering Series.
2) Raijive Ball -Introduction to Software Engineering.

List of Practicals

1. Design Graphics Editor which involve drawing points, circles, lines, square etc. OR

1.Simulation of CADST/AR Package, which is having following

i. Transistor
ii. Diode
iii. Resister
iv. Capacitor
v. VCC
vi. Ground
vii. Connection wire etc.
and their should be facilities to rotate, move etc. Text Editor using OOP (There should be minimum 10 function of MSWORD)

3. Screen design for Green house control plant showing detailed functions. OR Detailed design of Dairy Management. (Only screen design).

4. Simulation of Minimarket. OR

4.Simulation of Railway Reservation Bus reservation.

404191: PLC AND INDUSTRIAL CONTROLLERS Elective-II

Teaching Scheme:	Examination Scheme:
Lectures/Week : 4 Hrs	Paper: 100 Marks
Practicals/W eek : 2 Hrs .	Practical: 50 Marks

I. Review of "controllers: Open loop and closed loop control, transfer function, transient response & damping, on-off control, proportional control, integral control, derivative control, P+I, P+D and P+I+D actions.

2. Introduction to typical process control loop, Introduction to various control algorithms like ISA, interactive rate before reset etc. pm tuning, pm limitations.

3. Digital controller, Adaptive, self tuning pm controllers.

4. Introduction and applications of various control paradigms like cascade, ratio, selective, feedforward control etc.

5. Programmable Logic Controller : Introduction. . Types of processes (Batch and continuous discrete), Block schematic, relay logic, physical and .programmable ladder diagram, concept of scan time.

6. Programming techniques: Programming Input and Outputs, Instructions like Bit, Shift register, timer, counter,file transfer, data table monitoring, Advanced instructions like sequencer, data conversion etc.

7. PLC protocols, (e.g. Modbus, devicenet), networking of PLC's, configuration hardware selection, wiring.

8. PLC programme analysis, modification and trouble shooting. .

9. Applications of PLC in areas like Bummer management systems, Bottle filling plant. Dairy, Brewery, Cement, event sequencing, Automobile plants etc.

10. CASE Study of typical PLC systems like siemens, Allen Bradely, Messung etc.

11. SCADA system & its software.

Reference Books

1. B. J. Liptak -Industrial Control -Chinton
2. F. G. Shinskey -Process Control systems -TMH
3. C. D. Johnson -Process Control Instrumentation -PHI
4. J. D. Otter- Programmable Logic Controllers
5. J. W. Webb -Programmable Logic Controllers Principles and Applications
6. Astrom and Hagglund -PID Controllers -ISA
7. PLC Manual.

List of Practicals

1. Study of closed loop system for temp. control or water level control.

2. Digital PID controller algorithm and its tuning.

3. Ratio control algorithm,

4. Study of SLPC controller.

5. Development of ladder diagram for process control using on-off type input/output sequencer, timer, master control relay etc. Analog I/P discrete O/P (min 3).

6. CASE Study using PLC. (Pneumatics & hydraulic systems)

7. PiD algorithm using PLC.

8. Study of PLC simulator and SCADA Software.

404191 :IMAGE PROCESSING Elective- II.

Teaching Scheme: Examination Scheme :
Lectures/Week : 4 Hrs Paper: 100 Marks
Practicals/Week : 2 Hrs Practical: 50 Marks Termwork : 25 Marks

1. Introduction: Digital Image representation, Elements of Digital Image Processing Systems. Elements. of Visual perception structure of human eye, MTF of the visual system the visibility funciton, light luminance, brightness, contrast, monochrome vision models colour representation sampling & quantization colour vision model temporal properties of vision.

2. Statistical properties: Histogram mean, standard deviation, profile different distributions.

3. Image Transform: One and two dimensional DFT the discrete cosine transform, Hadamand transform the K-L transform.

4. Image enhancement : .Spatial and frequency .domain methods point operations, contrast stretching, bit extraction, range compression, Histogram equalization, modification local enhancement,image smoothing spatial operations, filtering multispectral, Image enhancement, intensity and log ratios principal components Pseudo- colour image enhancement.

5. Image-restoration : Inverse & Wiener filtering, removal of blur caused by motion spins, maximum entropy restoration Restoration in spatial domain geometric transformation spatial transformation.

6. Image analysis: Edge detection spatial feature and .boundary extraction, boundary representation, region representation structure shape features, texture, scene matching and detection, Image segmentation, classification, image understanding.

7. Image coding and Image compression: Pixel coding, PCM, entropy coding, run-length coding, bit-plane encoding, predicting techniques, DPCM adaptive technique transform coding bit allocation interframes coding, colour and multispectral. Image coding, JPEG and MPEG standards.

8. Applications of Image Processing: Character recognition, diagram understanding, fingerprint classification, face recognition.

Reference Books

1. Pratt, Digital Image Processing Wiley Int. 1991
2. Gonzawlez & Woods, Digital Image Processing Addison Wesley, 1992.
3. Sid Ahmed, Digital Image Processing McGraw Hill, 1995

List of Practicals

1. Studying and plotting different statistical properties of images, Histogram, Mean, Standard deviation, profile etc.

2. Displaying images. with different file formats as TIFF, BMP, GIF.

3. HIstogram equilization, Histogram modification.

4. Hadamard transform / K/L transform or Discrete cosine transform.

5. Image filtering image smoothing.

6. Edge detection different techniques.

7. Image segmentation

8. Pseudo colouring

9. Image texture based segmentation.

10. Study of different colour spaces.