SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

ELECTRONICS ENGINEERING

Syllabus Structure for

M.E. (Electronics Engineering) w.e.f. Academic Year 2013-14

SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY

STRUCTURE OF M.E. (ELECTRONICS ENGINEERING)
With Effect from Academic Year 2013-14

Four Semester Course

Semester-I

Sr. No.	Subject	Teaching Scheme				Credits			
		L	T	P	Total	Credits (L)	Credits (T)	Credits (P)	Total Credits
1	CMOS VLSI Design	3	-	2	5	3.0	-	1.0	4.0
2	Advanced Digital Signal Processing	3	-	2	5	3.0	-	1.0	4.0
3	Advanced Network Engineering	3	1	-	4	3.0	1.0	-	4.0
4	Random Signals & Processes	3	-	2	5	3.0	-	1.0	4.0
5	Elective I	3	1	-	4	3.0	1.0	-	4.0
6	Seminar- I	-	-	2	2	-	-	2.0	2.0
	Total	**15**	**2**	**8**	**25**	**15.0**	**2.0**	**5.0**	**22.0**

Note –

- Seminar I shall be delivered on a topic related to student's broad area of interest for dissertation work selected in consultation with the advisor after compiling the information from the latest literature. Student shall deliver seminar using modern presentation tools. A hard copy of the report (as per format specified by the department) shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.

Semester-II

Sr.	Subject	Teaching Scheme				Credits			
		L	T	P	Total	Credits (L)	Credits (T)	Credits (P)	Total Credits
1	Research Methodology	3	1	-	4	3.0	1.0	-	4.0
2	Embedded System Design	3	-	2	5	3.0	-	1.0	4.0
3	Peripheral System Design & Interfacing	3	-	2	5	3.0	-	1.0	4.0
4	Advanced Control Systems	3	-	2	5	3.0		1.0	4.0
5	Elective – II	3	1	-	4	3.0	1.0	-	4.0
6	Seminar – II	-	-	2	2	-	-	2.0	2.0
	Total	**15**	**2**	**8**	**25**	**15.0**	**2.0**	**5.0**	**22.0**

Note –

- Seminar II shall be delivered on a topic related to student's particular area of interest for dissertation work selected in consultation with the advisor after compiling the information from the latest literature. Student shall deliver seminar using modern presentation tools. A hard copy of the report (as per format specified by the department) shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.

List of elective subjects for semester I and II -

Sr.	Specialization	Elective - I	Elective - II
1	Telecommunication Engineering	Design of Wireless System	Mobile Technology
2	VLSI & Embedded	Advanced Digital System Design	Real Time Systems
3	Signal Processing	Image and Video Processing	VLSI in Signal Processing
4	Control Systems	Neural Networks & Fuzzy Control Systems	PLC, SCADA and Distributed Control System

Note –

- Student must select any one of the four specializations available.
- Student must opt for Elective I and Elective II from selected specialization only.
- Subjects may be added in the list of Elective I and II as per requirement.

w.e.f. Academic Year 2013-14

Solapur University, Solapur
M.E. (Electronics) Semester-I
CMOS VLSI DESIGN

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs. /Week	**Theory Credits –** 3.0
Practical – 2 Hrs. /Week	**Practical Credit-** 1.0

SECTION-I

Unit 1: MOS transistor theory: (06 Hrs.)
Physical structure of MOS transistor, accumulation, depletion & inversion modes, MOS device design equations, second order effects, Technology scaling

Unit 2: CMOS inverter: (06 Hrs.)
Static and dynamic behavior of CMOS inverter, power and energy delay, impact of technology scaling on inverter

Unit 3: Combinational logic design in CMOS: (08 Hrs.)
Static CMOS design- complementary CMOS, Ratioed logic and pass transistor logic; dynamic CMOS design- dynamic logic basic principle, speed and power dissipation, issues in dynamic design, cascading dynamic gates, comparison of static and dynamic designs in CMOS

SECTION-II

Unit 4: Sequential logic designs in CMOS: (06 Hrs.)
Static latches and registers- the bistability principle, multiplexer based latches, Master-slave edge triggered register, low voltage static latches, static SR flip flops, dynamic latches and registers- dynamic transmission-gate edge triggered registers, C2MOS- A clock- skew insensitive approach, true single-phase clocked register (TSPCR)

Unit 5: Timing issues in digital circuits: (07 Hrs.)
Timing classification: synchronous interconnect, mesochronous interconnect, plesiochronous interconnect, asynchronous interconnect, synchronous design- clock skew, jitter, clock distribution, latch based clocking, synchronizers and arbiters, using PLL for clock synchronization

Unit 6: Designing arithmetic and memory building blocks: (07 Hrs.)
Designing fast adders, designing fast multipliers, designing other arithmetic building blocks, designing ROMs, DRAMs & SRAMs

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum eight experiments based on above syllabus using any EDA software tool*

Reference books:

1. Digital Integrated Circuits, Rabey, Chandrakasan, Nikolic, Pearson Education
2. Principles of CMOS VLSI Design, Neil Weste, Kamran Eshraghian, Addison Wesley/Pearson Education
3. CMOS digital integrated circuits, Analysis and Design, Sung-Mo Kang, Yusuf Leblebici, TATA McGRAW Hill
4. CMOS VLSI design, Neil H. E. Weste, David Harris, Ayan Banerjee, Pearson Education

Solapur University, Solapur
M.E. (Electronics) Semester-I
ADVANCED DIGITAL SIGNAL PROCESSING

Teaching Scheme	Examination Scheme
Lectures – 3 Hrs. /Week	**Theory Credits –** 3.0
Practical – 2 Hrs. /Week	**Practical Credit-** 1.0

SECTION- I

Unit 1: Linear prediction and optimal linear filters: (07 Hrs.)
Forward and backward linear prediction; the optimum reflection for the forward and backward predictors; relationship of an AR process to linear prediction; the Levinson Durbin algorithm; the Schur algorithm; properties of the linear prediction –error filters

Unit 2: Power spectrum estimation: (07 Hrs.)
Estimation of spectra from finite duration observation of signals; computation of energy density function; estimation of auto-correlation and power spectrum of random signals; the period gram; the use of DFT in power spectrum estimation; parametric methods for power spectrum estimation; AR model parameters for power spectrum estimation

Unit 3: Design of digital filters: (06 Hrs.)
Symmetric and anti-symmmetric FIR filters, design of linear phase FIR filters by using frequency sampling method and windows design of optimum equi-ripple linear phase FIR filters; design of FIR differntiator design of Hilbert transformers, comparison of design methods

SECTION- II

Unit 4: IIR filters: (06 Hrs.)
Design of IIR filter using BLT method, design of digital filters based on least squares methods: pade approximation method; least squares design methods; frequency transformation

Unit 5: Multirate DSP: (07 Hrs.)
Decimation by a factor of D; interpolation by a factor of I; sampling rate conversion by a rational factor I/D; filter design & implementation for sampling rate conversion, direct from FIR filter structure; application of multirate DSP

Unit 6: Wavelet transforms: (07 Hrs.)
Introduction to wavelets, wavelets and wavelet expansion systems, discrete wavelet transform multi resolution formulation of wavelet systems, Haar wavelet and other wavelet representations, scaling function, wavelet functions, Parseval's theorem

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum eight experiments based upon above syllabus*

Reference books:

1. Digital signal processing- Principles, algorithms and applications, John. G Proakis, PHI Publication
2. Advanced DSP, Proakis, Rade, Ling, Mcmillan Publication
3. Discrete time signal processing, A.V. Oppenheim, R.W. Schafer
4. Theory and application of digital signal processing, I.R. Rabiner, Gold
5. Introduction to digital signal processing, Johnny R Johnson
6. Introduction to DSP, Roman Kuc, McGRAW Hill Publication
7. Digital Signal Processing, A computer based approach, Sanjit K. Mitra

Solapur University, Solapur
M.E. (Electronics) Semester-I
ADVANCED NETWORK ENGINEERING

Teaching Scheme	Examination Scheme
Lectures – 3 Hrs. /Week	**Theory Credits–** 3.0
Tutorial – 1 Hr. /Week	**Tutorial Credit –** 1.0

SECTION- I

Unit 1: Internet technology: (07 Hrs)
Network hardware components, ARP, RARP, performance issues in IP, Internet addresses, limitations of IPv4, IPv6, ICMP, TCP performance- TCP finite state diagram, congestion & its controlling, timers in TCP & its management, Kern's algorithm, UDP

Unit 2: Internet management: (04 Hrs.)
The level of management protocols, architectural model, protocol architecture, examples of MIB variables, the structure of Management information, format definitions DSN 1; structure and representation of MIB object names, simple network management protocol, SNMP message format

Unit 3: Internet security and firewall design: (09 Hrs.)
Protection resources, the need for an information policy, communication, cooperation, and mutual mistrust, mechanisms for internet security, cryptography, block ciphers, public key cryptography; firewalls and Internet access, multiple connections and weakest links, firewall implementation and high-speed hardware, packet-level filters, security and packet filter specifications, the consequence of restricted access for clients; accessing services through a firewall, the details of firewall architecture, types of fire walls, stub network, an alternative firewall implementation, monitoring and logging.

SECTION- II

Unit 4: Multimedia communications: (04 Hrs.)
Multimedia information representation, multimedia networks, multimedia applications, network QoS and application QoS

Unit 5: Detailed study of MPEG 4: (06 Hrs.)
Coding of audiovisual objects, MPEG 4 systems, MPEG 4 audio and video, profiles and levels; MPEG 7 standardization process of multimedia content description, MPEG 21 multimedia framework, significant features of JPEG 2000, MPEG 4 transport across the Internet

Unit 6: Multimedia communication across networks: (10 Hrs.)
Layered video coding, error resilient video coding techniques, multimedia transport across IP networks and relevant protocols such as RSVP, RTP, RTCP, DVMRP, multimedia in mobile networks, multimedia in broadcast networks

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference books:

1. Internetworking with TCP/IP, D.E.Comer Vol. I (4th Edition), Vol-II, Vol- III, PHI
2. UNIX Network Programming, Richard Steven, PHI, 3rd Edition
3. Data communications and networking, Behrmz Foruzan, TMH
4. Multimedia Communication Systems, K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovanovic, Pearson Education
5. Multimedia Communications, Fred Halsall, Pearson Education, 2001
6. Multimedia-Computing, Communications and Applications, Raif steinmetz, Klara Nahrstedt, Pearson Education

Solapur University, Solapur
M.E. (Electronics) Semester-I
RANDOM SIGNALS AND PROCESSES

Teaching Scheme
Lectures – 3 Hrs. /Week
Practical – 2 Hr. /Week

Examination Scheme
Theory Credits– 3.0
Practical Credit- 1.0

SECTION- I

Unit 1: Introduction to probability: (04 Hrs.)
Sample spaces, conditional probability, total probability and Bayes' theorem, independence of events, Bernoulli trails

Unit 2: Random variables: (08 Hrs.)
Cumulative distribution function, probability density function, statistical properties, moments, some special distributions- uniform, Gaussian and Rayleigh distributions; Binomial, and Poisson distributions, moment generating functions and characteristic functions, transformation of a random variable, conditional probability density

Unit 3: Multiple random variables: (08 Hrs.)
Joint cumulative distribution function, joint probability density function statistical properties, jointly distributed Gaussian random variables, conditional probability density, PDF of sum of random variables, almost sure (a.s.) convergence and strong law of large numbers, central limit theorem, estimation of population mean, expected value and variance and covariance, bounds and approximations- Chebysev inequality and Chernoff bound

SECTION- II

Unit 4: Random processes: (06 Hrs.)
Basic definitions, properties, auto correlation and cross correlation function, estimate of auto correlation function

Unit 5: Spectral density: (06 Hrs.)
Definition, properties, white noise, estimation of auto-correlation function using frequency domain technique, estimate of spectral density, cross spectral density and its estimation, coherence

Unit 6: Linear system: (04 Hrs.)
Properties, random inputs, estimate of response using frequency domain techniques, matched filter

Unit 7: Examples of random processes: (04 Hrs.)
White noise process and white noise sequence; Gaussian process; Poisson process, Markov process

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum eight experiments based upon above syllabus*

Reference Books:

1. Introduction to Probability and Random Processes, Jorge I. Aunin, V. Chandrashekar
2. Probability and Random Processes with Applications to Signal Processing, H.Stark, J. Woods (Indian Edition is available), Pearson Education, 3rd Edition
3. Introduction to Probability Theory with Stochastic Processes, K. L. Chung, Springer International student Edition.
4. Probability and Statistics and Queuing Theory, P. Kandasamy, Dr. K. Gunvanthi

Solapur University, Solapur
M.E. (Electronics) Semester-I
ELECTIVE I - DESIGN OF WIRELESS SYSTEM

Teaching Scheme

Lectures – 3 Hrs. /Week

Tutorial – 1 Hr./Week

Examination Scheme

Theory Credits– 3.0

Tutorial Credit- 1.0

SECTION- I

Unit 1: Design of amplifiers and oscillators: (10 Hrs)

Components at radio frequency, S parameters, digital modulation issues, designing with modulation/ demodulation ICs, distortion and noise products, wideband amplifiers design, parallel amplifiers design, audio amplifiers design, VGA amplifiers design, oscillator design issues, LC, crystal, VCO oscillator design and testing

Unit 2: Design of frequency synthesis: (05 Hrs.)

Review of PLL synthesis, PLL synthesis design; direct digital synthesis

Unit 3: Filter design: (05 Hrs.)

Review of lumped filter design, distributed filter design, diplexer filter design, crystal and SAW filter design, tunable filter design, filter issues

SECTION- II

Unit 4: Mixer design: (05 Hrs.)

Passive mixer design, active mixer design, image reject and harmonic mixers

Unit 5: Support circuit design: (05 Hrs.)

Design of frequency multipliers, RF switches, automatic gain control, splitters and combiners, antenna design

Unit 6: Comprehensive system design: (05 Hrs.)

Receiver as a system, transmitter as a system complete communication system, RF propagation considerations

Unit 7: Wireless systems simulation: (05 Hrs.)

Issues, discrete event simulation, simulation models, random number and variate generator, overview of design simulation software, case studies

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference books:

1. Complete Wireless Design, Coter W. Sayre, McGraw Hill, 2nd Edition
2. RF Circuit Design-Theory and Applications, Reinhold Ludwig, Pavel Bretchko, Pearson Education
3. Wireless Networks, P. Nicopolitidis, M.S. Obaidat, G.I. Papadimitriou, A.S. Pomportsis, Wiley India Edition

Solapur University, Solapur
M.E. (Electronics) Semester-I
ELECTIVE I - ADVANCED DIGITAL SYSTEM DESIGN

Teaching Scheme
Lectures – 3 Hrs. /Week
Tutorial – 1 Hr./Week

Examination Scheme
Theory Credits – 3.0
Tutorial Credit- 1.0

SECTION- I

Unit 1: Analysis and design using state machines: **(08 Hrs.)**
Clocked synchronous state machine analysis (state machine structure, output logic, characteristics equations of latch and flip-flops, analysis of state machines with D flip-flops) clocked synchronous state machine design with examples, designing state machines using state diagrams, state machine synthesis using transition lists

Unit 2: Timing and hazards: **(05 Hrs.)**
Static hazards, finding static hazards using maps, dynamic hazards, designing hazard free circuits, sequential circuit timing

Unit 3: Designing with FPGAs: **(07 Hrs.)**
Implementing functions in FPGAs, implementing functions using Shannon's decomposition,carry chains in FPGAs, cascade chains in FPGAs, Xilinx configurable logic block, the Altera logic element, dedicated memory in FPGAs, dedicated multipliers in FPGAs, cost of programmability, FPGA capacity, design translation (Synthesis)

SECTION II

Unit 4: Floating point- Arithmetic: **(07 Hrs.)**
Representation of floating point numbers (floating point formats- 2's complement, IEEE754), floating point multiplication, floating- point addition, floating- point subtraction, foating- point division

Unit 5: Design of Processor: **(07 Hrs.)**
Control and data path units of processor, design of serial multiplier, central processing unit - simple data path, controlling simple data path, control unit implementations -hard wired control unit, memory and I/O interface, contemporary microprocessors architectures: instruction pipelining, parallel hardware units, memory hierarchy, CISC, RISC

Unit 6: Hardware Testing and Design for Testability: **(06 Hrs.)**
Testing combinational logic, testing sequential logic, scan testing, boundary scan, built-in self-test

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference books:

1. Digital Design principles and practices, John F. Wakerly, Pearson education, 3rd Edition
2. Digital systems design using VHDL, Charles H. Roth, Lizy Kurian John, Cengage Learning, 2nd Edition
3. Digital Logic Design Principles, Norman Balabanian, Bradley Carlson, Wiley Publication.
4. Fundamentals of digital logic with VHDL Design, Stephen Brown, Zvonko Vranesic, Tata McGraw-Hill Publication

Solapur University, Solapur
M.E. (Electronics) Semester-I
ELECTIVE I – IMAGE AND VIDEO PROCESSING

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs. /Week	**Theory Credits–** 3.0
Tutorial – 1 Hr. /Week	**Tutorial Credit –** 1.0

SECTION I

Unit 1: Image sampling and quantization: **(04 Hrs.)**
Introduction, 2D sampling theory, limitations in sampling & reconstruction, quantization, optimal quantizer, compander, visual quantization

Unit 2: Image transforms: **(06 Hrs.)**
Introduction, 2D orthogonal & unitary transforms, properties of unitary transforms, DFT, DCT, DST, Hadamard, Haar, slant, KLT, SVD transform.

Unit 3: Image enhancement: **(06 Hrs.)**
Point operations, histogram modeling, spatial operations, transform operations, multi-spectral image enhancement, false color and pseudocolor, color image enhancement

Unit 4: Image filtering & restoration: **(06 Hrs.)**
Image observation models, inverse & Wiener filtering, Fourier domain filters, smoothing splines and interpolation, least squares filters, generalized inverse, SVD and iterative methods, maximum entropy restoration, Bayesian methods, coordinate transformation & geometric correction, blind de-convolution

Section– II

Unit 5: Image analysis & computer vision: **(06 Hrs.)**
Spatial feature extraction, transform features, edge detection, boundary extraction, boundary representation, region representation, moment representation, structure, shape features, texture, scene matching & detection, image segmentation, classification techniques.

Unit 6: Image data compression: **(06 Hrs.)**
Introduction, pixel coding, predictive techniques, transform coding, inter-frame coding, coding of two tone images, image compression standards

Unit 7: Video processing: **(06 Hrs.)**
Fundamental concepts in video – types of video signals, analog video, digital video, color models in video, video compression techniques – motion compensation, search for motion vectors, H.261, H.263, MPEG I, MPEG 2, MPEG 4, MPEG 7, content based video indexing

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Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference books:

1. Fundamentals of Digital Image Processing, K. Jain, Pearson education (Asia) Pte. Ltd. / Prentice Hall of India, 2004
2. Handbook of Image & Video Processing, Al Bovik, Elsevier Academic Press, 2nd Edition
3. Fundamentals of Multimedia, Z. Li, M.S. Drew, Pearson education (Asia) Pte. Ltd., 2004
4. Digital Image Processing, R. C. Gonzalez, R. E. Woods, Pearson education (Asia) Pte. Ltd. /Prentice Hall of India, 2004, 2nd Edition
5. Digital Video Processing, M. Tekalp, Prentice Hall, USA, 1995

Solapur University, Solapur
M.E. (Electronics) Semester-I
ELECTIVE I-NEURAL NETWORKS AND
FUZZY CONTROL SYSTEMS

Teaching Scheme
Lectures– 3 Hrs. /Week
Tutorial – 1 Hr. /Week

Examination Scheme
Theory Credits – 3.0
Tutorial credit – 1.0

SECTION- I

Unit 1: Artificial neural system-preliminaries: **(04 Hrs)**
Neural computations, models of artificial neural networks (ANN), neural processing, learning and adaptation, learning rules, applications of ANN

Unit 2: Feed-forward ANN and supervised learning: **(07 Hrs.)**
Single layer perception classifiers- continuous, discrete, multi category, multilayer feed-forward, error back propagation, learning factors, variants of back propagation, ANN as a statistical recognizer

Unit 3: Recurrent neuro-dynamical systems: **(05 Hrs.)**
Discrete time Hopfield ANN, gradient type Hopfield ANN, content addressable memory, simulated annealing, Boltzman machine, bidirectional associative memory

Unit 4: Identification, control and estimation using ANN: **(04 Hrs.)**
Linear system identification, autoregressive model, ARMA model, nonlinear system modeling, identification of control of nonlinear dynamical systems, independent component analysis, spectrum estimation, case studies

SECTION- II

Unit 5: Fuzzy control-preliminaries: **(07 Hrs.)**
Fuzzy sets, fuzzy relations, approximate reasoning, representing a set of rules, membership functions, fuzzy controller from industrial perspective, knowledge based system for process control, knowledge representation, applications of fuzzy logic

Unit 6: Fuzzy controller design: **(07 Hrs.)**
Structure of fuzzy controller, rule base, data base, inference engine, fuzzification and defuzzification, nonlinear fuzzy control, PID like fuzzy controller

**Unit 7: Fuzzy nonlinear simulation:** **(06 Hrs.)**
Relational equations, partitioning, non linear simulation using fuzzy rule based systems, fuzzy associative memories

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Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference Books:

1. Neural Networks- Classroom Approach, Satish Kumar, Tata McGraw-Hill Publishing Company Ltd.
2. Introduction to Artificial Neural Systems, Jacek M Zurada, Jaico Publishing House
3. Principles of Neurocomputing for Science and Engineering, Fredric M Ham, Ivica Kostanic, Tata McGraw-Hill Edition
4. Neural Networks and Learning Machines, Simon Haykin, Prentice Hall of India Pvt. Ltd.
5. An Introduction to Fuzzy Control, Dimiter Driankov, Hans Hellendoorn, Michael Reinfrank, Narosa Publishing House
6. Fuzzy Logic with Engineering Applications, Timothy J. Ross, McGraw Hill, Inc.

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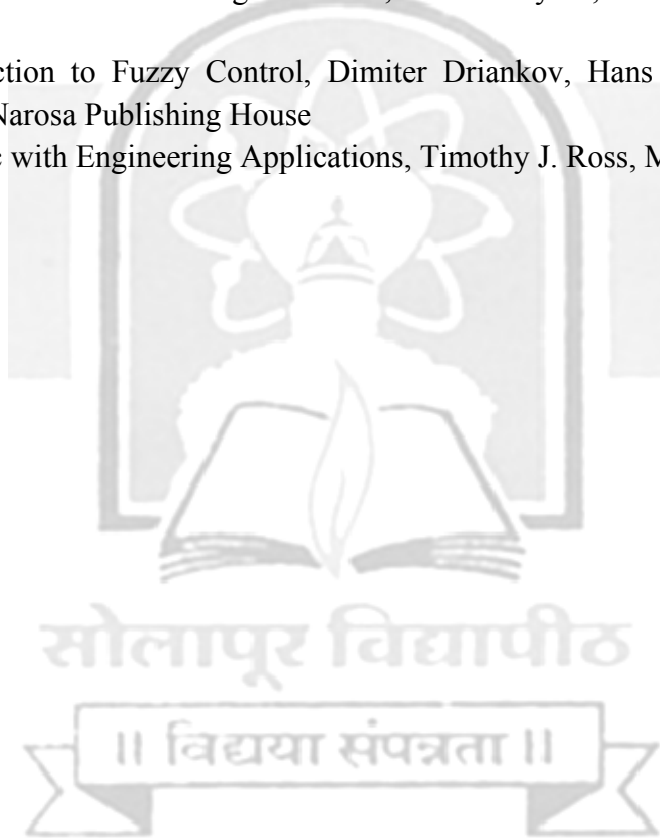
Solapur University, Solapur
M.E. (Electronics) Semester-II
RESEARCH METHODOLOGY

Teaching Scheme
Lectures – 3 Hrs. /Week
Tutorial – 1 Hr. /Week

Examination Scheme
Theory Credits – 3.0
Tutorial Credit- 1.0

SECTION- I

Unit 1: Research fundamentals: (06 Hrs.)
Definition, objectives, motivation, types of research and approaches, research- descriptive, conceptual, theoretical, applied and experimental

Unit 2: The initial research process: (06 Hrs.)
Literature review, research design, assortment of the problem, identification of problem, defining a problem, objective, sub objective and scope, assumptions, validation criteria, research proposal(synopsis)

Unit 3: Mathematical modeling and simulation: (08 Hrs.)
Mathematical modeling – need, techniques and classification, system models –types, static, dynamic, system simulation – why to simulate, technique of simulation, Monte Carlo simulation, types, continuous modeling, discrete model

SECTION II

Unit 4: Probability and statistics in simulation: (06 Hrs.)
Role of probability and statistics in simulation, statistical distributions, inference about the difference in means, statistical output analysis

Unit 5: Design of experiment: (06 Hrs.)
Strategy of experimentation, types, basic principle, guidelines, need of precision, types of errors

Unit 6: Report writing and presentation of results: (05 Hrs.)
Need, report structure, formulation, sections, protocols, graphs, tables, IEEE format, evaluation of report, writing abstract, writing technical paper

Unit 7: Information communication technology: (03 Hrs.)
Introduction, e-research, indices, patents, virtual lab, digital lab, ethical issues in research

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Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference books:

1. Fundamental of Research Methodology and Statistics, Yogesh Kumar Sing, New Age International Publishers
2. Research Methodology: Methods and Techniques, C.R. Kothari, New Age International Publishers, 2nd revised Edition
3. Research Methodology, Concepts and Cases, Deepak Chawla, Neena Sondhi, Vikas Publishing House Pvt. Ltd
4. Simulation Modeling and Simnet, Hamdy A. Taha, Prentice Hall International Edition
5. System Simulation, Geoffrey Gorden, Prentice Hall of India Pvt. Ltd.
6. Mathematical Modeling, J N Kapur, Wiley Eastern Ltd
7. Design and analysis of Experiments, Douglas C. Montgomery, Wiley Student Edition, 7th Edition
8. Role of ICT in Doctoral Research, Capt. Dr.Nitin P. Soaje

Solapur University, Solapur
M.E. (Electronics) Semester-II
EMBEDDED SYSTEM DESIGN

Teaching Scheme
Lectures– 3 Hrs. /Week
Practical – 2 Hrs. /Week

Examination Scheme
Theory Credits– 3.0
Practical Credit – 1.0

SECTION- I

Unit 1: Embedded architecture: (03 Hrs)
Embedded computers, characteristics of embedded computing applications, challenges in embedded computing system design, embedded memories, embedded system design process, designing hardware and software components

Unit 2: Embedded processor: (09 Hrs.)
ARM 9 architecture, instructions and data handling; interfacing with memory; interrupts, timers, ARM bus, I/O devices, I/O controllers, simple & autonomous I/O controllers, parallel, multiplexed, tristate, and open-drain buses, bus protocols, serial transmission techniques & standards, wireless protocol, CAN & advanced buses

Unit 3: Interfacing: (08 Hrs.)
Sensors and interfacing techniques, analog interfacing and data acquisition, timing generation and measurements, interfacing of serial bus protocols like I2C, RS485, CAN and USB, wireless protocols and interfacing of IRDA and SMART card

SECTION- II

Unit 4: Embedded system software: (04 Hrs.)
Software architectures, software developments tools, programming concepts, embedded programming in C and C++, queues, stacks, optimization of memory needs, program modeling concepts, software development process life cycle and its model, software analysis, design and maintenance

Unit 5: Real time operating systems: (10 Hrs.)
Operating system concepts, processes, deadlocks, memory management, input /output, files, security, the shell, recycling of concepts; operating system structure monolithic systems-layered systems, virtual machines, exo-kernels, client-server model; real time operating systems (µC/OS)- real-time software concepts, kernel structure, task management, time management, inter task communication & synchronization, memory management, and porting µCos-II; Linux/RT Linux- features of Linux, Linux commands, file manipulations, directory, pipes and filters, file protections, shell programming, system programming, RT Linux modules, POSIX Threads, mutex management, semaphore management

**Unit 6: System design:**   **(06 Hrs.)**

Design methodologies- requirement analysis, specification, system analysis and architecture design; modeling techniques- testing and debugging; quality assurance, design example- data base applications (smart cards), robotics (wireless), CCD camera (data compression)

Term work:

* *Term work shall consist of minimum eight experiments based upon above syllabus*

Reference books:

1. Introduction to Embedded Systems, Jonathan W. Valvano , Cengage 2009
2. ARM System Developer's Guide, Sloss, Symes, Wright, Morgan, Kaufmann, 2004, 1st Edition
3. Embedded Real Time Systems-Concepts, Design & Programming, Dr. K.V.K.K. Prasad, Dreamtech Publication
4. An Embedded Software Primer, David E. Simon, Pearson Education Publication.
5. ARM920T Technical Reference Manual (Rev 1) - ARM DDI 0151C, Data books of ARM7/ARM9 J., ARM Company Ltd.

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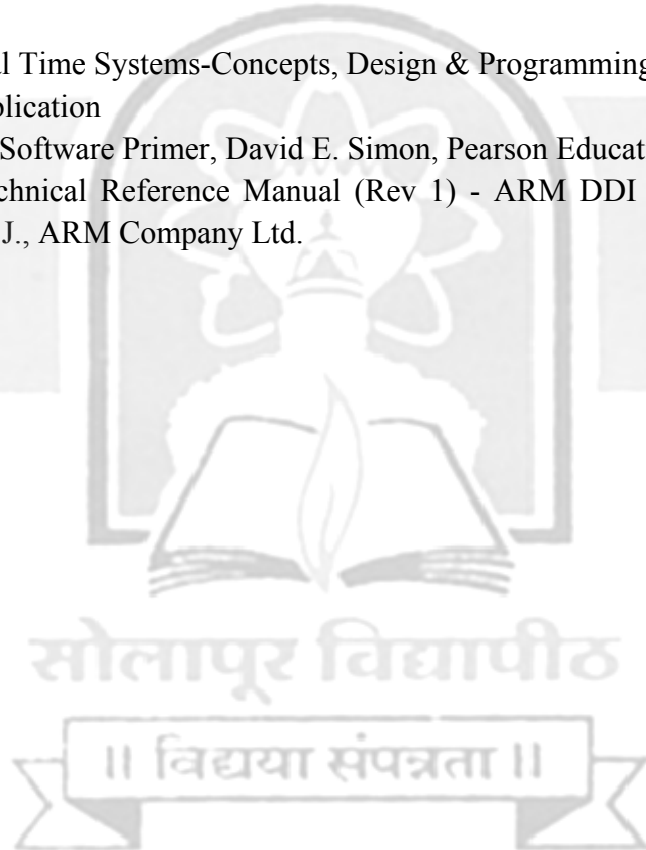
Solapur University, Solapur
M.E. (Electronics) Semester-II
PERIPHERAL SYSTEM DESIGN AND INTERFACING

Teaching Scheme
Lectures – 3 Hrs. /Week
Practical – 2 Hrs./Week

Examination Scheme
Theory Credits– 3.0
Practical Credit- 1.0

SECTION- I

Unit 1: Bus system: (06 Hrs.)
Bus systems in microcomputers ST 100 bus, Multi bus, EISA, PCI Bus, HP IB/GPIB bus & their applications

Unit 2: Interface: (06 Hrs.)
Standard I/O interfaces RS-232 C, RS-232 D centronics interface, current loop interface, RS-485and USB communication interface

Unit 3: Design criterion with PCs: (08 Hrs.)
Application of PC buses (ISA, EISA, PCI, and VESA-VL) and associated signals, handshakes, I/O and interrupt map, programming methodology for input/output application, GPIB signals and GPIB programming techniques operating system calls

SECTION- II

Unit 4: Peripherals: (05 Hrs.)
Communication controllers, DMA controller, programmable keyboard/display interfaces and associated circuitries.

Unit 5: Controllers: (07 Hrs.)
PID controllers, Programmable logic controllers, PC based data acquisition system.

Unit 6: Process network communication methods: (08 Hrs.)
HART communication, PROFIBUS, device-Net & Control-Net, industrial Ethernet

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum eight experiments based upon –*

1. Serial communication between PC and controller
2. Implementation of RS-485 communication
3. Design and simulation of PID controller for Temperature process station.
4. To study on the interface of PLC with PC for data acquisition applications.
5. Implementation of Digital PID Controller.
6. To auto tune a PID controller using a relay switch method for process control systems
7. Experimental Study of DCS and SCADA in a process control system.
8. To study the action of ON/OFF, P, PI, PID control for pressure process station.
9. Stability analysis of process control systems.
10. Process network communication using MODBUS, Profibus

Reference books:

1. Intelligent Instrumentation by George C. Barney- PHI.
2. Microprocessors with applications in process control by Ahson, S.I. - Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. PC-based Instrumentation-Concepts & Practice by N. Mathivanan-PHI
4. Industrial Instrumentation and Control by S. K. Singh- TATA McGraw-Hill
5. Instrumentation for Engg. Measurement by James W. dally, William F. Riley, John Wilay and Sons
6. Interfacing A Laboratory Approach by Deonzo, PHI

w.e.f. Academic Year 2013-14

Solapur University, Solapur
M.E. (Electronics) Semester-II
ADVANCED CONTROL SYSTEM

Teaching Scheme
Lectures– 3 Hrs. /Week
Practical – 2 Hrs./ week

Examination Scheme
Theory Credits – 3.0
Practical Credits – 1.0

SECTION- I

Unit 1: State space analysis: (07 Hrs.)
State space representation, state transition matrix, response of LTI system, controllability & observability, state representation of discrete system, transfer function of z-domain

Unit 2: Digital control system: (06 Hrs.)
Sampling and quantization effects, zero order hold-block, frequency domain consideration, difference domain representation, analysis in Z domain, transfer function, & complete response

Unit 3: Stability analysis: (07 Hrs.)
Mapping between S-plane & Z-plane, justify stability criteria, steady state error and error constant, root locus, bode and analytical methods of design, Lyapunov stability

SECTION- II

Unit 4: Pole placement and observer design: (06 Hrs.)
State feedback gain, design via pole placement, state observers, observer design, servo systems, design of state & output regulations

Unit 5: MIMO control: (07 Hrs.)
Models for multivariable systems, basic MIMO control loop, closed loop stability, pairing of inputs and outputs, converting MIMO problems to SISO problems

Unit 6: Robust control system: (07 Hrs.)
Introduction, system sensitivity, analysis of robustness, system with uncertain parameter, design of robust control system, design examples, robust internal model control system

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum eight experiments based upon above syllabus*

Reference books:

1. Adaptive and Robust Control, Karl Astorm, Wittenmark, Pearson Education, 1995.
2. Robust Control, Patros Ionnav, Jing Sun, Prentice Hall of India Pvt. Ltd., 1996.
3. Discrete Time Control System, K.Ogata, Tata McGraw Hill, Publication, 2001.
4. Control System Design, G.C.Goodwin, Graebe , Salgado Prantice Hall of India Pvt. Ltd.2002.

Solapur University, Solapur
M.E. (Electronics) Semester-II
ELECTIVE II- MOBILE TECHNOLOGY

Teaching Scheme
Lectures – 3 Hrs. /Week
Tutorial – 1 Hr. /Week

Examination Scheme
Theory Credits– 3.0
Tutorial Credit – 1.0

SECTION- I

Unit 1: GSM system overview: (08 Hrs)
GSM architecture, location tracking and call set up, security, data services, network signaling, MAP protocol and dialogue, mobility management, databases, failure restoration, overflow control, SMS protocol, international roaming, operations, administration and maintenance

Unit 2: General Packet Radio Services (GPRS): (06 Hrs.)
Functional groups, architecture, network nodes, interfaces, procedures, billing, mobility management, applications, EDGE

Unit 3: Wireless Application Protocol (WAP): (06 Hrs.)
Model, gateway, protocol, user agent profile and caching, wireless bearers, development toolkit, network and application environments, wireless markup language, telephony applications, MMS, other applications

SECTION II

Unit 4: Universal Mobile Telecommunication Services (UMTS): (07 Hrs.)
Migration path, air interfaces, URRAN architecture, speech call, packet data, handover, core network evaluation

Unit 5: CDMA 2000: (07 Hrs.)
Evaluation, network architecture and structure, radio network, 1xEVDO, 1xRTT

Unit 6: Security Issues in Mobile Technology: (06 Hrs.)
Information security, attacks, components of information security, security techniques and algorithms, security protocols, security models and frameworks

Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference Books:

1. Mobile Computing, Technology, applications and Service Creation, Asoke K. Talukder, Hasan Ahmed, Rupa R. Yavagal, Tata McGraw Hill Education Pvt. Ltd., 2nd Edition
2. 3G Wireless Networks, Clint Smith, Daniel Collins, Tata McGraw Hill Publishing Company Ltd., 2nd Edition
3. Wireless and Mobile Network Architecture, Yi-Bing Lin, Imrich Chlamtac, Wiley India

Teaching Scheme	Examination Scheme
Lectures – 3 Hrs. /Week	**Theory Credits–** 3.0
Tutorial – 1 Hr. /Week	**Tutorial Credit –** 1.0

SECTION- I

Unit 1: Introduction: (08 Hrs)

Introduction – issues in real time computing, structure of a real time system, task classes, performance measures for real time systems, estimating program run times, task assignment and scheduling, classical uniprocessor scheduling algorithms, uniprocessor scheduling of IRIS tasks, task assignment, mode changes and fault tolerant scheduling

Unit 2: Programming languages and tools-I: (06 Hrs.)

Programming languages and tools - desired language characteristics, data typing, control structures, facilitating hierarchical decomposition, packages

Unit 3: Programming languages and tools-II: (06 Hrs.)

Run time (exception) error handling, overloading and generics, multitasking, low level programming, task scheduling, timing specifications, programming environments, run – time support

SECTION II

Unit 4: Real time databases: (07 Hrs.)

Real time databases - basic definition, real time Vs general purpose databases, main memory databases, transaction priorities, transaction aborts, concurrency control issues, disk scheduling algorithms, two – phase approach to improve predictability – maintaining serialization consistency – databases for hard real time systems

Unit 5: Communication: (07 Hrs.)

Real – time communication – communications media, network topologies protocols, fault tolerant routing; fault tolerance techniques, fault types – fault detection; fault error containment redundancy, data diversity, reversal checks, integrated failure handling

Unit 6: Evaluation techniques: (06 Hrs.)

Reliability evaluation techniques – obtaining parameter values, reliability models for hardware redundancy, software error models; clock synchronization, clock, a non fault – tolerant synchronization algorithm, impact of faults, fault tolerant, synchronization in hardware, fault tolerant synchronization in software

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference Books:

1. Real – Time Systems, C.M. Krishna, Kang G. Shin, McGraw – Hill International Edition, 1997
2. Real-time systems- theory and practice, Rajib Mall, Pearson Education, 2007
3. Real Time Micro Computer System Design – An Introduction, Peter D. Lawrence, McGraw Hill, 1988
4. Introduction to real time software design, S.T. Allworth and R. N. Zobel, Macmillan, 2nd Edition, 1987
5. An Introduction to Real – Time Systems, R.J.A Buhur, D.L Bailey, Prentice – Hall International, 1999
6. Real Time System Design and Analysis, Philip A. Laplante, Prentice Hall of India, 3rd Edition, April 2004
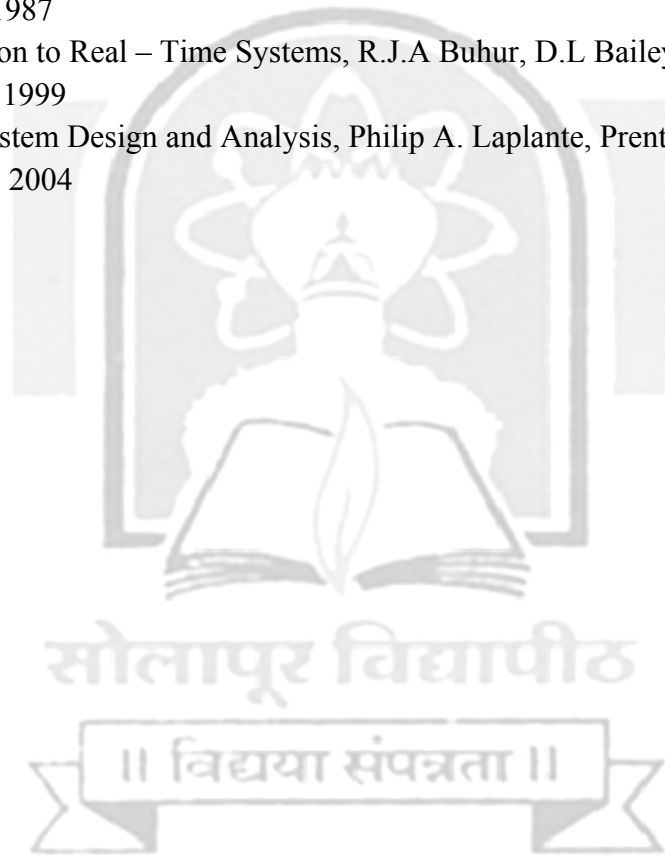
Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs. /Week	**Theory Credits–** 3.0
Tutorial – 1 Hr. /Week	**Tutorial Credit –** 1.0

SECTION- I

Unit 1: DFG representation and iteration bound: **(06 Hrs)**

Representations of DSP algorithms, data flow graph representations, critical path, loop bound, iteration bound, algorithms for computing iteration bound

Unit 2: Pipelining and parallel processing: **(06 Hrs.)**

Pipelining approach to reduce critical path, parallel processing to handle higher sample rates, power reduction computations, combined pipelining and parallel processing

Unit 3: Retiming: **(08 Hrs.)**

Introduction to retiming, definitions and properties, solving system of inequalities, cut set retiming and pipelining, retiming for clock period minimization, retiming for register minimization

SECTION II

Unit 4: Unfolding: **(06 Hrs.)**

Introduction to unfolding, algorithm for unfolding, properties of unfolding, applications of unfolding

Unit 5: Folding: **(05 Hrs.)**

Introduction to folding, folding transformation, lifetime analysis for register minimization in folded architecture

Unit 6: Systolic array design: **(05 Hrs.)**

Methodologies, family of systolic arrays (FIR filter) using linear mapping techniques, matrix – matrix multiplication

Unit 7: Bit level arithmetic architectures: **(04 Hrs.)**

Parallel multiplication with sign extension**,** parallel carry ripple array multipliers, parallel carry save array multipliers, parallel multipliers with modified booth recording

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference Books:

1. VLSI Digital Signal Processing Systems- Design and Implementation, Keshav K. Parhi, Wiely (India)
2. Architecture for Digital Signal Processing, Peter Pirsch, Wiley India
3. Digital Signal Processing in VLSI, Richard J. Higgins
4. VLSI Synthesis of DSP Kernels-Algorithmic and Architectural Transformations, Mahesh Mehendale, Sunil D. Sherlekar

w.e.f. Academic Year 2013-14

Solapur University, Solapur
M.E. (Electronics) Semester-II
ELECTIVE II- PLC, SCADA AND DISTRIBUTED CONTROL SYSTEMS

Teaching Scheme
Lectures – 3 Hrs. /Week
Tutorial – 1 Hr. /Week

Examination Scheme
Theory Credits– 3.0
Tutorial Credit- 1.0

SECTION- I

Unit 1: Introduction to programmable logic controllers: **(07 Hrs)**
Building blocks of automation, controllers- PLC, role of PLC in FA, architecture of PLC, advantages, types, programming of PLC, simple process control programming using relay ladder logic & Boolean logic methods, PLC- arithmetic functions.

Unit 2: PLC networking: **(06 Hrs.)**
PLC networking standards, vertical integrator of Ind-automation, field bus & Ethernet, HMI system, text display, operator panel, touch panel – panel PCS, integrated display – PLC & HMI.

Unit 3: Supervisory control and data acquisition: **(07 Hrs.)**
Supervisory control & DAS- overview, developer & runtime packages, architecture, tools, internal & external graphics, alarm logging, tag log structured tags, report generation, VB & C scripts for SCADA application.

SECTION- II

Unit 4: Communication protocols: **(07 Hrs.)**
Communication protocols of SCADA– Proprietary & open protocols – OLE / OPC, DDE-server/client configuration, massaging, user administration, interfaces of SCADA with PLC, driver & field devices.

Unit 5: Distributed control system: **(07 Hrs.)**
Difference between SCADA & DCS, architecture, local control unit, programmer languages, communication facilities, operator interface, engineering interface

Unit 6: Application of SCADA & DCS: **(06 Hrs.)**
Case studies of process plants using SCADA & DCS, advanced features/ option in SCADA & DCS, role of PLC in DCS & SCADA, comparison – field devices, sensors, drives etc in DCS & SCADA.

w.e.f. Academic Year 2013-14

Term work:

- *Term work shall consist of minimum six assignments based upon above syllabus*

Reference Books:

1. Computer Control of Manufacturing Systems, Yoram Koren, Tata Mc-Graw Hill Publication, 1988, 1st Edition
2. Programmable Logic Controllers, Prentice Hall of India Publications, 2005, 5th Edition
3. Distributed Control Systems, Michael lucas, Van Nostrand Reinfold Company
4. Cimlicicity SCADA Packages Manuals, Fanuc India ltd., 2004.

w.e.f. Academic Year 2013-14