Solapur University, Solapur

M.E. (Electronics) Semester-I

ELECTIVE I-NEURAL NETWORKS AND FUZZY CONTROL SYSTEMS

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

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.

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

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

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	Examination Scheme
Lectures– 3 Hrs. /Week	**Theory Credits–** 3.0
Practical – 2 Hrs. /Week	**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.

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

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

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

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

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

Solapur University, Solapur
M.E. (Electronics) Semester-II
ELECTIVE II- REAL TIME 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: **(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

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

Solapur University, Solapur
M.E. (Electronics) Semester-II
ELECTIVE II-VLSI IN DIGITAL SIGNAL PROCESSING

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

Examination Scheme
Theory Credits– 3.0
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

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

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

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 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

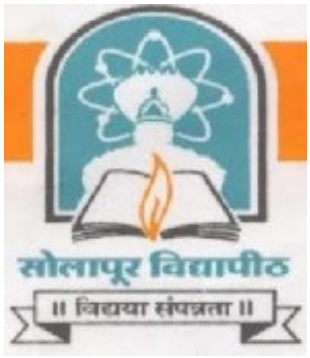
Unit 6: Application of SCADA & DCS: (06 Hrs.)
Case studies of process plants using SCADA & DCS, advanced features/ option in SCADA & DCS, role of PLC in DCS & SCADA, comparison – field devices, sensors, drives etc in DCS & SCADA.

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.



SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

ELECTRONICS ENGINEERING

Syllabus for

M.E. (Electronics Engineering) Semester III and IV
w.e.f. Academic Year 2014-15

SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY

STRUCTURE OF M.E. (ELECTRONICS ENGINEERING)
With Effect from Academic Year 2014-15

Four Semester Course

Semester-III

Sr. No.	Subject	Teaching Scheme				Credits			
		L	T	P	Total	*Credits (L)*	*Credits (T)*	*Credits (P)*	*Total Credits*
1	Self Learning Subject	$	-	-	-	3.0	-	-	3.0
2	Lab Practice	-	-	2	2	-	-	1.0	1.0
3	Dissertation Phase I : Synopsis Submission Seminar* (ISE)	-	-	4@	4@	-	-	3.0	3.0
4	Dissertation Phase II : Term Work*(ISE)	-	-	-	-	-	-	3.0	3.0
5	Dissertation Phase II Progress Seminar* (ESE)	-	-	-	-	-	-	6.0	6.0
Total		**-**	**-**	**6**	**6**	**3.0**	**-**	**13.0**	**16.0**

Note –

- $- Being a Self Learning Subject, student shall prepare for examination as per specified syllabus
- *- For all activities related to dissertation Phase I (synopsis submission seminar and progress seminar) student must interact regularly every week with the advisor.
- Synopsis submission seminar shall cover detailed synopsis of the proposed work. Student shall submit synopsis of the dissertation work only after delivering this seminar.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report 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.

Note (Continued)

- Lab Practice shall include any of the below activities related to dissertation work and recommended by advisor. Student shall submit a report after completion of the activity to advisor–
  Software assignments, learning new software, hardware realization, literature survey, filed work, industrial training etc.
- @ Indicates contact hours of students for interaction with advisor.
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of Solapur University, Solapur

- **List Self Learning Subjects -**

Sr.	***Specialization***	***Self Learning Subjects***
1	Telecommunication Engineering	Network and Internet Security
2	VLSI & Embedded	Programmable System on Chip (PSoC)
3	Signal Processing	Advanced Signal and Image Processing
4	Control Systems	Advanced Process Control

Note –

- Student must select Self Learning Subject as per their specialization already selected in Semester I and II
- New Self Learning Subjects may be added as and when required

SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY

STRUCTURE OF M.E. (ELECTRONICS ENGINEERING)
With Effect from Academic Year 2014-15

Four Semester Course

Semester-IV

Sr. No.	Subject	Teaching Scheme				Credits			
		L	T	P	Total	*Credits (L)*	*Credits (T)*	*Credits (P)*	*Total Credits*
1	Dissertation Phase III : Progress Seminar# (ISE)	-	-	6@	6@	-	-	4.0	4.0
2	Dissertation Phase IV: Term Work #(ISE)	-	-	-	-	-	-	6.0	6.0
3	Final Submission of the Dissertation and Viva –Voce (ESE)	-	-	-	-	-	-	6.0	6.0
Total		**-**	**-**	**6**	**6**	**-**	**-**	**16.0**	**16.0**

Note –

- #- For all activities related to dissertation Phase II student must interact regularly every week with the advisor.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report 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.
- Student must submit a hard copy of project report to the department
- @ Indicates contact hours of students for interaction with advisor.
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of Solapur University, Solapur

Solapur University, Solapur
M.E. (Electronics)
Self Learning Subject
NETWORK AND INTERNET SECURITY

Examination Scheme
Theory Credits – 3.0

SECTION-I

Unit 1: Introduction:
Overview of ISO's OSI model and TCP/IP model, key management, public-key infrastructure (PKI), remote user authentication using symmetric key encryption, Kerberos, remote user authentication using asymmetric key encryption, federated identity management, biometrics

Unit 2: Wireless network security:
IEEE 802.11 wireless LAN overview: IEEE 802.11 network components, architectural model, IEEE 802.11 services; IEEE 802.11i wireless LAN security: IEEE 802.11i services, IEEE 802.11i phases of operation, discovery phase, authentication phase, key management phase & protected data transfer phase, IEEE 802.11i pseudorandom function

Unit 3: WAP security:
Wireless application protocol (WAP): WAP architecture, wireless application environment, WAP protocol architecture; wireless transport layer security (WTLS): WTLS sessions and connections, WTLS protocol architecture, cryptographic algorithms**,** WAP end-to-end security

SECTION II

Unit 4: Electronic mail security:
Pretty good privacy (PGP): notation, operational description, cryptographic keys and key rings, public-key management, S/MIME: RFC 5322, multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing, enhanced security services, domain keys identified mail**:** internet mail architecture, e-mail threats, DKIM strategy, DKIM functional flow

Unit 5: Web and IP security:
Web security: web security requirements, secure sockets layer (SSL), transport layer security (TLS), and secure electronic transaction (SET), HTTPS, secure shell (SSH), IP security: IP security overview, architecture, authentication, encapsulating security payload, combining security associations, key management

Unit 6: System security:
Intruders, intrusion detection; password management, malicious software, viruses and related threats, virus countermeasures, distributed denial of service attacks, firewalls: firewall design, principles, trusted systems

- *Student must complete at least one assignment based on each unit and submit it to department for assessment.*

- **Text Books:**
  1. Cryptography and Network Security: Principles and Practice, 5th Edition, William Stallings, Pearson Education, ISBN: 978-81-317-6166-3
  2. Cryptography and Network Security, Behrouz A. Forouzan, Tata McGraw-Hill. 2007, ISBN: 978-00-706-6046-5

- **Reference Books:**
  1. Network Security And Cryptography, Bernard Menezes, Cengage Learning, 2010, ISBN : 978-81-315-1349
  2. Applied Cryptography, 2nd Edition, Schneier B, Wiley & Sons. 2002, ISBN: 0-471-11709-9

Solapur University, Solapur
M.E. (Electronics)
Self Learning Subject
PROGRMMABLE SYSTEM ON CHIP (PSoC)

Examination Scheme
Theory Credits – 3.0

SECTION-I

Unit 1: Introduction to PSoC:
PSoC technology, programmable routing and interconnect, configurable analog and digital blocks, cpu sub system, families of PSoC (PSoC 1, PSoC 3, PSoC 5), difference between PSoC and conventional MCU.

Unit 2: Introduction to PSoC 3/5:
PSoC 3/5, architecture – block diagram, system wide resources, I/O interfaces, CPU sub system, memory organization, digital sub systems, analog sub systems

Unit 3: PSoC design modules:
Why cypress PSoC, structure of PSoC, PSoC designer suit, limitations of PSoC, improvements of the PSoC, PSoC sub system design, PSoC memory management.

SECTION-II

Unit 4: Mixed-signal embedded design:
Overview of mixed-signal embedded system designs, hardware and software subsystems of mixed-signal architecture, PSoC hardware components, PSoC software components, PSoC interrupt sub system, introduction to PSoC express, system design using PSoC express.

Unit 5: PSoC components:
Universal digital blocks (UDB), UDB arrays and digital system interconnect (DSI), timer, counter and PWM, digital filter blocks (DFB), $\Delta\sum$ ADC topologies and circuits, programmable gain amplifiers, switched capacitor / continuous time, analog routing, flash temperature sensors, DTMF dialers, sleep timers, UART, I2 C, SPI, USB, CAN buses.

Unit 6: System design using PSoC:
Interfacing of temperature sensors and tachometers, SPI and UART based task communications, lower noise continuous time signal processing with PSoC, data acquisition and control system with PSoC, ultra wide-based RADAR, serial bit receiver with hardware Manchester decoder, DTMF detector, ultrasonic vehicle parking assistant, universal wide-range signal generator.

- *Student must complete at least one assignment based on each unit and submit it to department for assessment.*

- **Text Books:**
  1. PSoC 3, PSoC 5 Architecture technical reference manual, Cypress website
  2. My First Five PSoC 3 design (e-book), Robert Asbhby, Cypress website

- **Reference Books:**
  1. Designer Guide to the Cypress PSoC, Robort Ashby, Elsevier Publications
  2. Introduction to Mixed Signal Embedded Design, Alex Doboli, Springer
  3. The Beginners Guide to Using PSoC Express: Mixed-Signal Microcontroller Development without Code, Oliver H. Bailey, Timelines Industries Incorporated, 2007
  4. PSoC Mikrocontroller by Fredi Kruger Franzis, 2006

- **Web References:**
  1. www.cypress.com/go/psoc
  2. www.cypress.com/go/trainning
  3. www.cypress.com/go/support
  4. www.psocdeveloper.com

Solapur University, Solapur
M.E. (Electronics)
Self Learning Subject
ADVANCED SIGNAL AND IMAGE PROCESSING

Examination Scheme
Theory Credits – 3.0

SECTION-I

Unit 1: Biometric technologies:
Biometric systems, biometric functionalities, biometric system errors, design cycle of biometric systems, application of biometric systems, security and privacy issues, case study: design of iris recognition system

Unit 2: Applications of fuzzy logic:
Fuzzy logic in power plants, fuzzy logic in data mining, fuzzy logic in image processing, fuzzy logic in biomedicine, fuzzy logic in industrial and control applications

Unit 3: Medical image processing:
Biomedical image processing, noise reduction filters for medical images, feature extraction and statistical measurements, medical image restoration, bio-medical image segmentation

SECTION-II

Unit 4: Low power design:
Scaling versus power consumption, power analysis, power reduction techniques, power estimation approaches

Unit 5: Programmable digital signal processors:
Evolution of programmable digital signal processors, important features of dsp processors, dsp processors for mobile and wireless communications, processors for multimedia signal processing.

Unit 6: Optimization techniques:
Scheduling and allocation techniques, Euclidean GCD algorithm, orthonormality of Schur polynomials, fast binary adders and multipliers

- *Student must complete at least one assignment based on each unit and submit it to department for assessment.*

- **Reference Books:**

1. Introduction to Biometrics, A.K.Jain, Springer Publication
2. Introduction to Fuzzy Logic using MATLAB, S.N. Sivanandam, S. Sumathi, S. N. Deepa, Springer Publication
3. Medical Image Processing Concepts and Applications, Sinha, G.R., Patel, Bhagwati
4. VLSI Digital Signal Processing Systems- Design and Implementation, Keshav K. Parhi, Wiely (India)
5. Architecture for Digital Signal Processing, Peter Pirsch, Wiley India

Solapur University, Solapur
M.E. (Electronics)
Self Learning Subject
ADVANCED PROCESS CONTROL

Examination Scheme
Theory Credits – 3.0

SECTION-I

Unit 1: Process dynamics and mathematical modeling:
Modeling procedure, linearization, numerical solutions of ordinary differential equations, input-output models and transfer functions, dynamic behavior of typical process systems, serial & parallel structures of simple systems, multiple input-multiple output systems

Unit 2: Empirical model identification:
An empirical model building procedure, process reaction curve methods, statistical model identification.

Unit 3: Conventional feedback control system:
Desired features of a PID controller, PID controller tuning for dynamic performance, stability analysis of control systems, controller tuning based on stability: Ziegler – Nichols closed loop method, digital implementation of process control, effects of digital control on stability, tuning and performance, performance of feedback control systems

Unit 4: Cascade & feed forward control:
Cascade control: design criterion, cascade performance, controller algorithm & tuning, implementation issues; feed forward control: design criterion, feed forward performance, controller algorithm and tuning, implementation issues; analyzing a nonlinear process with linear feedback control, different issues in improving nonlinear process performance

SECTION-II

Unit 5: Model based control:
The structure of model based control, modeling approaches, internal model control (IMC), the Smith predictor, model predictive control (MPC), process model based control (PMBC), implementation guidelines.

Unit 6: Nonlinear adaptive control:
Adaptation of feedback parameters, programmed adaptation, switching controller gains and self-tuning controllers: model based methods, model reference adaptive control, pattern recognition controllers.

Unit 7: Multivariable control:
Multi-loop control, effects of interaction, performance analysis, multivariable predictive control and dynamic matrix control (DMC) approach for signal variable and multivariable, implementation issues in DMC.

Unit 8: Statistical process control:
Shewhart chart, interpretation of chart, distinction between automatic process control (APC) & statistical process control (SPC), implementing SPC concepts.

- *Student must complete at least one assignment based on each unit and submit it to department for assessment.*
- **Reference Books:**

1. Process Control: Designing Processes & Control Systems for Dynamic Performance, Thomas E.Marlin, McGRAW Hill International Edition.
2. Process Control: Instrument Engineers Handbook, Editor, Bela G. Liptak, Butterworth - Heinemann Publishers.
3. Process Dynamics: Modeling, Analysis & Simulation, B. Wayne Bequette, Prentice Hall International Edition.
4. Process Modeling, Simulation and Control for Chemical Engineers, William Luben, McGraw Hill International Edition.
5. Process control systems: Application, Design and Turning, F.G. Sinskey, McGraw Hill Publication
6. Applied Process Control by M. Chidambaram, Allied Publishers Ltd