VII SEMESTER(IV/IV – ISEM)								
S. NO	**COURSE CODE**	**SUBJECT NAME**	**L**	**T**	**P**	**HOURS**	**CREDITS**	
1	11-EE304	Control Systems	3	0	2	6	4	13ES203
2	13-EC-206	CMOS VLSI Design	3	0	2	6	4	13EC201
3		**PE-III**	3	0	0	3	3	
4		**PE-IV**	3	0	0	3	3	
5		**PE-V**	3	0	0	3	3	
6	13AC201	Energy & Society	2	0	0	2	0	
7		Minor Project	0	0	6			
		OR						
1	13 PS 401	Practice School	0	0	36		18	

OPEN ELECTIVES

			LTP	CREDITS		**PREREQUISITES**
13OE421	LINUX PROGRAMING		3-0-0	3	OE-1	NIL

PROFESSIONAL ELECTIVES

EMBEDDED STREAM

13EM336	EMBEDDED NETWORKING		3-0-0	3	PE-3	11EC311
11 EM 430	Advanced Embedded Processor Architecture		3-0-0	3	PE-4	11EC311
11 EM 432	Hardware Software Co Design		3-0-0	3	PE-5	11EC311

WEB TECHNOLOGIES STREAM

13 EM 335	Web Middleware And Web Services		3-0-0	3	PE-3	11EM301
13 EM 431	Enterprise Programming		3-0-0	3	PE-4	11EM301
13 EM 433	Semantic Web		3-0-0	3	PE-5	11EM301

IV/IV BTECH

SYLLABUS

Course Code : 11-EE 304
Course Name : **Control Systems**
Course Detail : Theory
Course Structure : Credits: 4 L-T-P: 3-0-2
Prerequisite : 13ES203

SYLLABUS

Introduction: Control system terminology, examples of simple control systems, open loop and closed loop control systems, types of control systems **Mathematical models of physical systems:** Formulation of differential equations for electrical systems Transfer functions of open and closed loop systems, DC & AC servomotors, synchro pair as error detector, block diagram representation of control system, block diagram algebra, signal flow graph, Manson's gain formula**. Time domain analysis:** Standard test signals-step, ramp, parabolic and impulse; impulse response, characteristic equation of feedback systems, transient response of first order and second order systems to standard test signals, time domain specifications, steady state error and error constants, Introduction to P, PI, PID controllers. **Stability analysis:** Concept of stability and conditions for stability, Routh –Hurwitz criterion, dominant poles of transfer function **Root Locus Technique:** The root locus concept, basic properties, magnitude and angle conditions, properties and construction of the complex root loci, effects of adding poles and zeros to G(s) H(s) on the root loci. **Frequency response Analysis & Design:** Introduction, frequency response specifications, correlation between time and frequency response, specifications, polar(Nyquist) plot, Bode plot, phase margin and gain margin; stability analysis from Nyquist plot effect of adding poles & zeros to G(s) H(s) on the shape of polar plots. Preliminary design considerations-Introduction to lead, lag, lead-lag compensation techniques in frequency domain. **State space analysis:** Concepts of state, state variables, state vector, input vector, output vector; development of state models for simple systems, solution of state equation, the state transition ,matrix and its properties; characteristic equation and transfer function from state models, Eigen values and Eigen vectors. Diagonalization, transformation to phase variable canonical form, diagonal canonical form, Jordan canonical form. Concepts of Controllability and observability.

Text Books:

1. J.Nagrath & M Gopal, " Control Engineering", 2nd edition New Age International Publication
2. B.C. Kuo, "Automatic Control Systems", Prentice Hall India Publications

Reference:

1. K Ogata, "Modern Control Engineering" Prentice Hall India Publications
2. M.Gopal, " Control Systems Principles and Design" Tata Mc-Graw Hill Publications

Course No : 13EC206
Course Title : **CMOS VLSI Design**
Course Detail : Theory & Lab
Course Structure : Credits: 4 L – T – P: 3--0--2
Pre-requisite : 13EC201

SYLLABUS

Technology Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & Bi-CMOS Technologies. VLSI Fabrication, Oxidation, Lithography, Diffusion, Ion Implantation, Metallization, Integrated Resistors and Capacitors. **MOS Theory Analysis:** Basic Electrical Properties of MOS Circuits: ***Ids-Vds*** Relationships, MOS Transistor Threshold Voltage ***Vth***, ***gm***, ***gds***, Figure of Merit ***ωo***, Short Channel and Narrow Channel Width Effects. Pass Transistor, Transmission Gate, NMOS Inverter, Various Pull-ups, CMOS Inverter Analysis and Design, Bi-CMOS Inverters, Latch up in CMOS Circuits. **CMOS Circuits and Logic Design Rules:** MOS Layers, Stick Diagrams, Design Rules and Layout, 2μm, 1.2 μm Design Rules, Rules for Vias and Contacts, Stick Diagrams and Simple Symbolic Encodings for NMOS, PMOS, CMOS and BiCMOS Logic Gates. Scaling of CMOS Circuits. **CMOS Circuit Charactersation and Performance Estimation:** Sheet Resistance ***RS*** and its Concept to MOS, Area Capacitance Units, Calculations - Delays, Driving Large Capacitive Loads, Delay Estimation, Logical Effort and Transistor Sizing, Power Dissipation, Reliability. **CMOS Fault models:** need for testing, manufacturing test principles.

TEXT BOOKS

1. Kamran Ehraghian, Dauglas A. Pucknell and Sholeh Eshraghiam, “Essentials of VLSI Circuits and Systems” – PHI, EEE, 2005 Edition.
2. Neil H. E. Weste and David. Harris Ayan Banerjee,, “CMOS VLSI Design” - Pearson Education, 1999.

REFERENCES

1. Sung-Mo Kang, Yusuf Leblebici,” CMOS Digital Integrated Circuits” TMH 2003
2. Jan M. Rabaey, “Digital Integrated Circuits” Pearson Education, 2003
3. Wayne Wolf, “Modern VLSI Design ", 2nd Edition, Prentice Hall, 1998.

SIMULATION TEXT BOOKS

1. Etienne Sicard, Sonia Delmas Bendhia, “Basics of CMOS Cell Design”, TMH, EEE, 2005.

PROFESSIONAL ELECTIVES

Course No : 13 EM 336
Course Title : Embedded Networking
Course Detail : Theory
Course Structure : Credits: 3 L – T – P: 3--0--0
Pre-requisite : 11EC311

SYLLABUS

EMBEDDED COMMUNICATION PROTOCOLS: Embedded Networking: Introduction – Serial/Parallel Communication – Serial communication protocols -RS232 standard – RS485 – Synchronous Serial Protocols -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) – PC Parallel port programming -ISA/PCI Bus protocols – Firewire. **USB AND CAN BUS**: USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC 18 Microcontroller USB Interface – C Programs –CAN Bus – Introduction - Frames –Bit stuffing –Types of errors –Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN. **ETHERNET BASICS:** Elements of a network – Inside Ethernet – Building a Network: Hardware options – Cables, Connections and network speed – Design choices: Selecting components –Ethernet Controllers – Using the internet in local and internet communications – Inside the Internet protocol. **EMBEDDED ETHERNET**: Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure. **WIRELESS EMBEDDED NETWORKING**: Wireless sensor networks – Introduction – Applications – Network Topology – Localization –Time Synchronization - Energy efficient MAC protocols –SMAC – Energy efficient and robust routing – Data Centric routing

TEXT BOOKS

1. Frank Vahid, Givargis ‘Embedded Systems Design: A Unified Hardware/Software Introduction’, Wiley Publications
2. Jan Axelson, ‘Parallel Port Complete’, Penram publications
3. Dogan Ibrahim, ‘Advanced PIC microcontroller projects in C’, Elsevier 2008
4. Jan Axelson ‘Embedded Ethernet and Internet Complete’, Penram publications
5. Bhaskar Krishnamachari, ‘Networking wireless sensors’, Cambridge press 2005

Course No : 11 EM430
Course Title : Advanced Embedded Processor Architectures.
Course Detail : Theory
Course Structure : Credits: 3 L – T – P: 3--0--0
Pre-requisite : 13 EC311

SYLLABUS

ARM Processor as System-on-Chip: Acorn RISC Machine – Architecture inheritance – ARM programming model – ARM development tools – 3 and 5 stage pipeline ARM organization – ARM instruction execution and implementation – ARM Co-processor interface. **ARM Assembly Language Programming:** ARM instruction types – data transfer, data processing and control flow instructions – ARM instruction set – Co-processor instructions, Thumb Instruction set. **Architectural Support for System Development:** Advanced Microcontroller bus architecture – ARM memory interface – ARM reference peripheral specification – Hardware system prototyping tools – ARMulator – Debug architecture. **ARM Processor Cores:** ARM7TDMI, ARM8, ARM9TDMI, ARM10TDMI, The AMULET Asynchronous ARM Processors-AMULET1. **Embedded ARM Applications:** The VLSI Ruby II Advanced Communication Processor, The VLSI ISDN Subscriber Processor, The OneC™ VWS22100 GSM chip, The Ericssion-VLSI Bluetooth Baseband Controller, The ARM7500 and ARM7500FE

TEXT BOOKS (MAXIMUM 2)

1. ARM System on Chip Architecture – Steve Furber – 2nd ed., 2000,Addison Wesley Professional.
2. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st ed., 2004, Springer

REFERENCE BOOKS (MAXIMUM 2)

1. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM

2. System on Chip Verification – Methodologies and Techniques –Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001,Kluwer Academic Publishers.

Course No : 11 EM 432
Course Title : Hardware Software Co -Design
Course Detail : Theory
Course Structure : Credits: 3 L – T – P: 3--0--0
Pre-requisite : 11 EC 311

SYLLABUS:

Co- Design Issues: Co- Design Models, Architectures, Languages, A Generic Co-design Methodology. **Co- Synthesis Algorithms:** Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis. **Prototyping and Emulation:** Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping. **Target Architectures:** Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems. **Compilation Techniques and Tools for Embedded Processor Architectures:**
Modern embedded architectures, embedded software development needs, compilation technologies practical consideration in a compiler development environment. **Design Specification and Verification:** Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, interface verification **Languages for System – Level Specification and Design-I** System – level specification, design representation for system level synthesis, system level specification languages. **Languages for System – Level Specification and Design-II** Heterogeneous specifications and multi-language co-simulation the cosyma system and lycos system.

TEXT BOOKS:

1. Hardware / software co- design Principles and Practice – Jorgen Staunstrup, Wayne Wolf – 2009, Springer.
2. Hardware / software co- design Principles and Practice, 2002, kluwer academic publishers

Course No : 13 EM 335
Course Title : WEB MIDDLEWARE AND WEB SERVICES
Course Detail : Theory
Course Structure : Credits: 3 L – T – P: 3--0--0
Pre-requisite : 11EM301

Syllabus

Distributed Information systems – design, architecture and communication, Middleware – understanding middleware, RPC and related middleware, TP monitors, object brokers, message-oriented middleware. Enterprise Application Integration (EAI) – from middleware to application integration, EAI middleware **Workflow management systems**, Web technologies – exchanging information over the internet, web technologies for supporting remote clients, application servers and application integration. Web services and their approach to distributed computing, Web services technologies and web services architecture **Basic web services technology,** minimalistic infrastructure. SOAP, WSDL, UDDI, web services at work, interactions between specifications, related standards. Service coordination protocols, introduction, infrastructure for coordination protocols. **WS-coordination,** WS-transaction, RosettaNet, other standards, Service composition – basics, a new chance of success, service composition models, dependencies between coordination and composition. **BPEL, Outlook** – state of the art in web services, applicability of web services, web services as a problem and solution. Case studies - Web services: industry adoption, case studies: context setting, a proposed solution.

Textbooks

1. Web Services: Concepts, Architectures and Applications (Data-Centric Systems and Applications) – Gustavo Alonso, Fabio Casati, Harumi kuno and Vijay Machiraju, Springer pub, 2003
2. Web Services, An introduction, B.V. Kumar and S.V Subrahmanya, Tata Mcgraw Hill, 2004

References

1. Web Services Essentials Distributed Applications with XML-RPC, SOAP, UDDI & WSDL by Ethan Cerami, O'Reilly , First Edition, February 2002.
2. Programming Web Services with SOAP by James Snell, O'Reilly First Edition Dec 2001.
3. Web Services Theory & Practice by Anura Guruge, Digital Press, 2004.
4. Executive's Guide to Web Services by Eric A. Marks & Mark. J. Werrell, John Wiley & Sons, 2003.

Course No : 13-EM431
Course Title : ENTERPRISE PROGRAMMING
Course Detail : Theory
Course Structure : Credits: 3 L – T – P: 3--0--0
Pre-requisite : 11EM301

Syllabus

Java EE Essentials, J2EE Multi-Tier Architecture, Advanced JSP topics, Java Server Faces, Working with Databases, Advanced topics in JDBC. EJB Fundamentals and Session Beans, EJB Entity Beans, Message Driven Beans, EJB Relationships, EJB QL, and JDBC. Design Patterns and EJB. J2EE Design patterns and Frameworks: Pattern Catalog- Handle-Forward pattern, Translator pattern, Distributor pattern, Broadcaster pattern, Zero sum pattern, Status Flag Pattern, Sequencer pattern, Behavior Separation pattern, Consolidator pattern, Simplicity pattern, Stealth Pattern. Web Services and JAX-WS. Java Mail API, Java Interface Definition Language and CORBA, Java Remote Method Invocation, Java Messaging Service, Java Naming and Directory Interface API.

TEXTBOOKS:

1. Kevin Mukhar, James L. Weaver, Jim Crume, Chris Zelenak, “Beginning Java EE 5 from Novice to Professional”, Apress, 2005 Edition.
2. James Keogh, “J2EE: The Complete Reference”, McGraw-hill Osborne Media: 1st Edition, 2002.

REFERENCES:

1. Jan Graba, “An Introduction to Network Programming with Java”, Springer, 2nd edition, 2006.
2. Antonio Goncalves, “Beginning Java EE 6 Platform with GlassFish 3”, Apress, 2009.
3. Mark D Hansen, “SOA Using Java web services”, Pearson, 2007.
4. Dreamtech Software Team, “Java Server Programming J2EE: Black Book”, Wiley, 2007.

Course No : 13 EM 433
Course Title : SEMANTIC WEB
Course Detail : Theory
Course Structure : Credits: 3 L – T – P: 3--0--0
Pre-requisite : 11EM301

Syllabus

INTRODUCTION Components – Types – Ontological Commitments – Ontological Categories – Philosophical Background -Sample - Knowledge Representation Ontologies – Top Level Ontologies – Linguistic Ontologies – Domain Ontologies – Semantic Web – Need – Foundation – Layers – Architecture. **LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES** Web Documents in XML – RDF - Schema – Web Resource Description using RDF- RDF Properties – Topic Maps and RDF – Overview – Syntax Structure – Semantics – Pragmatics - Traditional Ontology Languages – LOOM- OKBC – OCML - Flogic Ontology Markup Languages – SHOE – OIL - DAML + OIL- OWL **ONTOLOGY LEARNING FOR SEMANTIC WEB** Taxonomy for Ontology Learning – Layered Approach – Phases of Ontology Learning – Importing and Processing Ontologies and Documents – Ontology Learning Algorithms - Evaluation **ONTOLOGY MANAGEMENT AND TOOLS**
Overview – need for management – development process – target ontology – ontology mapping – skills management system – ontological class – constraints – issues. Evolution – Development of Tools and Tool Suites – Ontology Merge Tools – Ontology based Annotation Tools. **APPLICATIONS** Web Services – Semantic Web Services - Case Study for specific domain – Security issues – current trends.

TEXT BOOKS

1. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez “Ontological
Engineering: with examples from the areas of Knowledge Management, eCommerce and the Semantic Web” Springer, 2004
2. Grigoris Antoniou, Frank van Harmelen, “A Semantic Web Primer (Cooperative Information Systems)”, The MIT Press, 2004
3. Alexander Maedche, “Ontology Learning for the Semantic Web”, Springer; 1 edition, 2002

REFERENCES

1. John Davies, Dieter Fensel, Frank Van Harmelen, “Towards the Semantic Web: Ontology – Driven Knowledge Management”, John Wiley & Sons Ltd., 2003.
2. John Davies (Editor), Rudi Studer (Co-Editor), Paul Warren (Co-Editor) “Semantic Web Technologies: Trends and Research in Ontology-based Systems”Wiley Publications, Jul 2006
3. Dieter Fensel (Editor), Wolfgang Wahlster, Henry Lieberman, James Hendler, “Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential”, The MIT Press, 2002
4. Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, “The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management”, Wiley, 2003

OPEN ELECTIVES

13 OE 421
LINUX PROGRAMMING
L-T-P 3-0-0 Credits: 3
Prerequisite: Nil

Linux Utilities-File handling utilities, Security by file permissions, Process utilities ,Disk utilities Text processing utilities, and Backup utilities Sed- scripts, operation, addresses, commands, applications, Awk execution, field and records , scripts, operation, patterns, actions functions using system commands in awk. Working with Bourne again Shell (bash) responsibilities, here documents , running shell script, Shell as a programming language, shell meta characters, Control structures, arithmetic in shell, examples Interrupt processing, functions, debugging shell scripts. Files : file Concept , File System Structure, I nodes, File Attributes, File types Library functions ,standard and formatted I/O in C, stream errors Kernel support for files ,System calls, file descriptors, low level file access File structure related system calls (FILE APIS), file and record locking File and directory management-Directory file APIS, Symbolic links and hard links. Process concept, Kernel support for process, process attributes, process creation , waiting for a process, Process termination ,Zombie process, orphan process, Process APIs Introduction to signals, signal generation and handling ,Kernel support for signals, signal function, unreliable signals , reliable signals Kill ,raise, alarm, pause, abort, sleep functions. Introduction to IPC, pipes, FIFOs- Introduction to three types of IPC-message queues, semaphores and shared memory -Kernel support for messages, Unix system V APIs for messages- Client /Server example

Text Books:

1. Unix system Programming using C++ T.Chan , PHI (UNIT III to Unit VIII)
2. Unix Concept and Applications, 4th edn. Sumitabha dasTMH
3. Beginning Linux programming 4th edn. N. Matthew, R stones Wrox Wiley India edn.

Reference Books:

1. Linux system Programming , Robot Love, O;Reilly, SPD
2. Unix Network Programming , W.R. Stevens , PHI
3. Unix and Shell Programming , B. A. Forouzan and R.F Gilberg, Cengage learning
4. Unix Internals , U Vahalia , Pearson Educaiton Unix and shell Pr