Faculty of Engineering
Osmania University

SCHEME OF INSTRUCTION & EXAMINATION

B.E IVth YEAR (COMPUTER SCIENCE & ENGINEERING)

With effect from Academic Year: 2009-2010

SEMESTER-I

Sl No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination		
			Periods per week		Duration in Hours	Maximum Marks	
			L/T	D/P		Univ. Exam	Sessional
THEORY							
1	CS-401	Distributed Systems	4	-	3	75	25
2	CS-402	Artificial Intelligence	4	-	3	75	25
3	CS-403	Compiler Construction	4	-	3	75	25
4	CS-404	Embedded Systems	4	-	3	75	25
5.		Elective –I	4	-	3	75	25
PRACTICALS							
6	CS-431	Distributed Systems Lab	-	3	3	50	25
7	CS-432	Embedded Systems Lab	-	3	3	50	25
8	CS-433	Compiler Construction Lab	-	3	3	50	25
8	CS-434	Project Seminar	-	3	-	-	25
		Total :	20	12		525	225

Elective-I

CS-411	Information Security
CS-412	Simulation and Modeling
CS-413	Image Processing
CS-414	Adhoc and Sensor Networks
CS-415	Middleware Technologies
CS-416	Advanced Computer Architectures

CS-401

DISTRIBUTED SYSTEMS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Characterization of Distributed Systems

Introduction; Examples of distributed systems; Resource sharing and the web; Challenges;

System Models
Introduction; Architectural models; Fundamental models;

Operating System Support
Introduction; The operating system layer; Protection; Processes and threads; Communication and invocation; Operating system architecture;

UNIT-II

Interprocess Communication

Introduction; The API for the internet protocols; External data representation and marshalling;

Client server communication; Group communication; Case study: Interprocess communication in UNIX;

Distributed objects and Remote Invocation
Introduction; Communication between distributed objects; Remote procedure call; Events and notifications; Case study: Java RMI;

Name Services
Introduction; Name services and the Domain Name System;
Directory services; Case study of the X.500 Directory Service;

UNIT – III

Time and Global States
Introduction; Clocks, events and process states; Synchronizing physical clocks; Logical time and logical clocks; Global states; Distributed debugging;

Coordination and Agreement
Introduction; Distributed mutual exclusion; Elections; Multicast communication; Consensus and related problems

UNIT – IV

Transactions and Concurrency Control
Introduction; Transactions; Nested transactions; Locks; Optimistic concurrency control; Timestamp ordering; Comparison of methods for concurrency control;

Distributed Transactions

Introduction; Flat and nested distributed transactions; Atomic commit process; Concurrency control in distributed transactions; Distributed deadlocks; Transaction recovery;

Replication

Introduction; System model and group communication; Fault-tolerant services; Case study: The gossip architecture, CODA

UNIT – V

Distributed Shared Memory
Introduction; Design and implementation issues; Sequential consistency and Ivy case study; Release consistency and Munin case study; other consistency model;

Distributed File Systems

Introduction; File service architecture; Case study: Sun Network File System; Enhancements and further developments;

Suggesting Reading:

1. Colouris, Dollimore, Kindberg," Distributed Systems Concepts and Design" 4th Ed. Pearson Education, 2009.

References:

2. Andrew S. Tanenbaum, Van Steen, "Distributed Systems", Pearson Education 2002.
3. Singhal M, Shivratari N.G, "Advanced Concepts in Operating Systems" Mc Graw Hill 1994.
4. Pradeep K Sinha, "Distributed Operating Systems : Concepts and Design", Pearson Education Asia India 2007

CS-402

ARTIFICIAL INTELLIGENCE

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Introduction: Definition, history and applications of AI. Search in State Spaces: Agents that plan, Uninformed search, Algorithm A*, Heuristic Functions and Search Efficiency, Alternative Search Formulations and Applications, Adversarial Search.

UNIT – II

Knowledge Representation and Reasoning: The Propositional Calculus, Resolution in Propositional Calculus, The Predicate Calculus, Resolution in Predicate Calculus, Rule-Based Expert Systems, Representing Common Sense Knowledge.

UNIT-III

Reasoning with Uncertain Information (Nilsson).
Planning (Nilsson): The Situation Calculus, Planning.

UNIT-IV

Learning from Observations: Learning decision-trees using Information theory, Learning General Logical Descriptions, Neural Networks: Perceptron, Multilayer feed-forward network. Rule Learning.

UNIT-V

Natural Language Processing: Communication among agents, Speech Recognition: Signal Processing, Speech Recognition Model (Language Model + Acoustic Model), The Viterbi Algorithm.

Suggested Reading:

1. Nils J. Nilsson (1988) Artificial Intelligence: A New Synthesis, Elsevier
2. Stuart Russell, Peter Norvig (1995), Artificial Intelligence – A Modern Approach, Pearson Edition/PHI.

References :

1. Elaine Rich and Kevin Knight (2009), Artificial Intelligence, 3rd Ed. Tata McGraw Hill.
2. George F Luger (2009), Artificial Intelligence, Structures and strategies for Complex Problem solving, Pearson Edition.

CS-403

COMPILER CONSTRUCTION

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Introduction – programs related to compilers. Translation process. Major data structures. Other issues in compiler structure. Boot strapping and porting.

Lexical analysis – The role of Lexical Analyzer. Input Buffering. Specification of Tokens. Recognition of Tokens. The Lexical-Analyzer Generator Lex.

UNIT-II

Syntax Analysis – Introduction. Top-Down parsing, Bottom-Up parsing, Introduction to LR Parsing. More powerful LR parsers. Using Ambiguous Grammars. Parser Generators Yacc.

UNIT-III

Syntax Directed Translation – Syntax Directed Definitions. Evaluation Orders for SDDs. Applications of Syntax Directed Translation

Intermediate code generation. Variants of syntax trees. Three-Address Code, Types and Declarations. Translation of Expressions. Type Checking. Control Flow. Back patching. Switch-statements. Intermediate Code for procedures.

UNIT-IV

Storage Organization. Stack Allocation of Space. Access to Non local Data on the Stack. Heap Management. Introduction to Garbage Collection.

Code Generation – Issues in the Design of a Code Generator. The Target Language. Addresses in the Target Code Basic Blocks and Flow Graphs. Optimization of Basic Blocks. Peephole Optimization. Register Allocation and Assignment. Machine Independent Optimizations – The Principal Sources of Optimizations.

UNIT-V

Linkers and Loaders – Basic Loader functions. Design of an Absolute Loader. A simple bootstrap loader. Machine dependent and independent features. Relocation. Program Linking. Algorithms And Data Structures For a Linking Loader. Automatic Library Search. Loader Options – Loader Design options. Linkage Editing. Dynamic linking.

CS-403

Suggested Reading:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman – Compilers: Principles, Techniques &Tools – Pearson Education
2. Leland L Bech – System Software: An Introduction to Systems Programming – Pearson Education Asia.

References:

3. Kenneth C Louden – Compiler Construction: Principles and Practice – Cengage Learning.

CS-404

EMBEDDED SYSTEMS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Embedded Computing: Introduction, Complex Systems and Microprocessor, 1be Embedded System Design Process, Formalisms for System Design, Design Examples. The 8051 Architecture: Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

UNIT-II

Basic Assembly Language Programming Concepts: 1be Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions.
Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.

UNIT-III

Applications: Interfacing with Keyboards, Displays, D/A and NO Conversions, Multiple Interrupts, Serial Data Communication. Introduction to Real- Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT-IV

Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source);
Embedded Software Development Tools:
Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

UNIT-V

Introduction to advanced architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Net advanced embedded systems: Bus protocols, 12C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.

CS-404

Suggested Reading:

1. Computers and Components, Wayne Wolt Elsevier.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
3. An Embedded Software Primer, David E. Simon, Pearson Education

References:

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, Tata McGraw Hill.
3. Micro Controllers, Ajay V Deshmllkhi, TMIL
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.

CS 411

INFORMATION SECURITY

(Elective – I)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Introduction: Characteristics of Information, Components of Information Systems, Securing components, balancing Security and Access
The Security System Development Life Cycle, Security Professionals and the organization.
Security Investigation Phase; Need for security, Threats, Attacks.

UNIT-II

Legal, Ethical, and Professional Issues in Information Security
Ethical Component in Information System, Codes of Ethics, Certification
Security Analysis: Risk Management, Identifying and assessing risk, Controlling Risk.

UNIT –III

Logical Design: Blue print for security.
Security Policy, standards and Practices.
Design of Security Architecture
Physical Design: Security Technology, Physical Design of Security SDLC Firewalls, Dialup Protection, Intrusion Detection Systems, Scanning and analysis tools, Content filters.

UNIT-IV

Cryptography: The basic elements of cryptography: symmetric (Symmetric Key-DES, IDEA, and
AES), and public key cryptography (Public Key Encryptions-RSA).

UNIT-V

Message digest (MD-5, SHA), digital signatures.
SSL and SET: SSL and SET protocols, Internet transactions using both SSL and SET.

Suggested Reading:

1. Michael E. Whitman and Hebert J Mattord, Principles of Information Security, 2nd Ed. Cengage Learning 2008.
2. William Stallings, Cryptography and Network Security, Pearson Education, 2000.

References:

3. Nina Godbole, Information Systems Security, Wiley-2009.

CS-412

SIMULATION AND MODELING

(Elective – I)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Introduction to Simulation. Advantages and Disadvantages of Simulation. Areas of application. System and System Environment. Components of a system. Discrete and Continuous Systems. Model of a System. Types of Models. Discrete-Event System Simulation. Steps in a Simulation Study. Simulation Examples.

UNIT-II

Overview of statistical models and queuing systems. Programming languages for simulation. Continuous and discrete simulation languages – FORTRAN, GPSS, SIMAN, SIMSCRIPT, SLAM and MODSIM III

UNIT-III

Random Numbers: generation, properties of random numbers, generation of pseudo random numbers, tests for random numbers. Random variate: generation, inverse transformation technique, uniform distribution, exponential distribution, Weibul's distribution, triangular distributions, Direct transformation for the normal distribution, convolution method of Erlang distribution, Acceptance rejection techniques: Poisson distribution, Gamma distribution.

UNIT – IV

Input data analysis: Data Collection: Identify the distribution, parameter & estimation Goodness of fit tests: Chi square test-KS test; Multivariate and time series input models, Verification and validations of simulation models, Model building, verification and validation: Verification of simulation models, Calibration and validation of models face validity, Validation of model assumptions, validation input/output Transformations, Input/output validation using historical input data, Input/output validation using Turing test.

UNIT – V

Output data analysis, stochastic nature of output data, Types of simulation with respect to output analysis, Measures of performance and their estimation, Output analysis for terminating simulations, Output analysis for steady-state simulations. Comparison and evaluation of alternative system designs: Comparison of several system designs, Statistical models for estimating the effect of design alternatives.

CS - 412

Suggesting Reading:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, and David M. Nicol. Discrete-Event System Simulation, Pearson Education Asia, 2001.

References:

2. Narsingh Deo. System Simulation with Digital Computers. Prentice Hall of India, 1979.
3. Anerill M Law and W. David Kelton-Simulation modeling and anlaysis. McGrw Hill, 2009.

CS-413

IMAGE PROCESSING

(Elective – I)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Introduction to Digital Image Processing, Origins and Applications of Digital Image Processing. Fundamental Steps in Digital Image Processing, Components of Digital Image Processing System. Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization

UNIT-II

Filtering in the Frequency Domain: Preliminary Concepts, Sampling and the Fourier Transform of Sampled Functions, The Discrete Fourier Transform (DFT) of One Variable, Extension to Function of Two Variables, some Properties of the 2-D Discrete Fourier Transform, Image Smoothing and Sharpening using Frequency Domain Filters.

UNIT-III

Intensity Transformations and Spatial Filtering: Histogram Processing, Fundamental of Spatial Filtering, Smoothing and Sharpening Spatial Filters. Image Segmentation: Point, Line and Edge Detection, Thresholding, Region-Based Segmentation.

UNIT-IV

Image Compression: Fidelity Criteria, Image Compression Models, Image Formats, Containers and Compression Standards, Compression Methods: Huffman Coding, Golomb Coding, Arithmetic Coding, LZW Coding, Run-Length Coding.

UNIT-V

Restoration: Noise Models, Inverse filtering. Least squares Filtering.
Object Recognition: Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods.

CS -413

Suggested Reading:

1. Gonzalez R.C., Woods R.E: Digital Image Processing, Pearson Education, Third Edition 2008.

References:

1. William K. Pratt, "Digital Image Processing", John Wiley & Sons Inc. 3rd Edition 2001.
2. McAndrew, Introduction to Digital Image Processing , Cengage Learning 2004.
3. Sonka, Hlavac, Boyle, Digital Image Processing and Computer Vision, Cengage learning 2008
4. Rosenfeld A. Kak AC: Digital Picture Processing Vol.I & II Acad, Press, 2nd Edition 1982.

CS-414

ADHOC AND SENSOR NETWORKS

(Elective – I)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Ad Hoc Networks:

Introduction and Definitions; Ad Hoc Network Applications; Design Challenges;
Evaluating Ad Hoc Network Protocols –the Case for a Test bed.

Routing in Mobile Ad Hoc Network:

Introduction; Flooding; Proactive Routing; On Demand Routing ;
Proactive Versus on –demand Debate.; Location based Routing

UNIT-II

Multicasting in Ad Hoc Networks:

Introduction; Classifications of Protocols ;Multicasting Protocols; Broadcasting ;
Protocol Comparisons; Overarching Issues;

Transport layer Protocols in Ad Hoc Networks:

Introduction ;TCP and Ad-hoc Networks; Transport Layer for Ad-hoc Networks: Overview;
Modified TCP;TCP-aware Cross-layered Solutions;
AD-hoc Transport Protocol.;

UNIT-III

QoS Issue in Ad-hoc Networks:

Introduction ;Definition of QoS; Medium Access Layer; QoS Routing;
Inter-Layer Design Approaches;

Security in Mobile Ad-Hoc Networks:

Vulnerabilities of Mobile Ad Hoc Networks ;Potential Attacks;Attack Prevention
Techniques;Intrusion Detection Techniques.

UNIT-IV

Introduction and Overview of Wireless Sensor Networks:

Introduction ;
Basic Overview of the Technology;

Applications of wireless Sensor Networks:

Introduction; Background; Range of Applications; Examples of Category 2 WSN Applications; Examples of Category 1 WSN applications.; Another Taxonomy of WSN Technology.;

Basic Wireless Sensor Technology:
Introduction; Sensor Node Technology; Sensor Taxonomy

UNIT-V

Wireless Transmission Technology and Systems:

Introduction; Radio technology Primer; Available Wireless Technologies.;

Medium Access Control Protocols for Wireless Sensor Networks:

Introduction; Background; Fundamentals of MAC Protocols.

Suggested Reading:

1. Prasant Mohapatra and Srihanamurthy, " Ad Hoc Networks Technologies and Protocols, Springer, Springer International Edition-2009.

2. Kazem Sohraby, Daniel Minoli, Taieb Znati, Wireless Sensor Networks, A John Wiley & Sons, Inc., Publication-2007.

CS-415

MIDDLE WARE TECHNOLOGIES

(Elective – I)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT –I

CLIENT/SERVER CONCEPTS

Client – Server – File Server, Database server, Group server, Object server, Web server. Middleware – General middleware – Service specific middleware. Client/Server Building blocks – RPC – Messaging – Peer – to – Peer. Web Services- SOA, SOAP, WSDL, REST Services.

UNIT-II

EJB ARCHITECTURE

EJB –EJB Architecture – Overview of EJB software architecture – View of EJB – Conversation – Building and Deploying EJBs – Roles in EJB.

UNIT-III

EJB APPLICATIONS

EJB Session Beans – EJB clients – EJB Deployment – Building an application with EJB.

UNIT-IV

CORBA

CORBA – Distributed Systems – Purpose – Exploring CORBA alternatives – Architecture overview – CORBA and networking model – CORBA object model – IDL – ORB – Building an application with CORBA

UNIT-V

COM

COM – Data types – Interfaces – Proxy and stub – Marshalling – Implementing server/Client – Interface pointers – Object Creation, Invocation, Destruction – Comparison COM and CORBA – Introduction to .NET – Overview of .NET architecture–Marshalling – Remoting

Suggested Reading:

1. Robert Orfali, Dan Harkey and Jeri Edwards, "The Essential Client/server Survival Guide" . Galgotia publications Pvt. Ltd., 2002.(Unit 1)
2. Tom Valesky, "Enterprise Java Beans", Pearson Education, 2002.(Unit 2 & 3)
3. Jason Pritchard. "COM and CORBA side by side", Addison Wesley,2000 (Unit 4 & 5)
4. Jesse Liberty, "Programming C#", 2nd Edition, O'Reilly press,2002. (Unit 5)
5. Arno Puder, kay Romere and Frank pilhofer. Distributed Systems Architecture, Morgan Kaufman 2006

References:

1. Mowbray, " Inside CORBA", Pearson Education, 2002.
   Jeremy Rosenberger, "Teach yourself CORBA in 14 days", Tec media,2000

CS-416

ADVANCED COMPUTER ARCHITECTURES

(Elective – I)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Computational Models: The concept of a computational model, Basic computational models, the von Neumann computational model, key concepts relating to computational models.
The concept of Computer Architecture: Evaluation and interpretation, Interpretation of the concept of computer architectures at different levels of abstraction, as a multilevel hierarchical framework, Extensions & description of computer architectures,
Introduction to Parallel Processing: Basic concepts, Types and levels pf parallelism, classification of parallel architectures, basic parallel techniques, Relationships between languages and parallel architectures,
Introduction to ILP-Processors: Evaluation and overview of ILP-Processors, Dependencies between instructions, Instruction scheduling, preserving sequential consistency, the speed-up potential of ILP-Processing,
Pipelined Processors: Basic concepts, Design space of pipelines, Overview of pipelined instruction processing, Pipelined execution of integer and Boolean instructions, Pipelined processing of loads and stores.

UNIT-II

VLIW Architectures: Basic Principles, Overview of proposed and commercial VLIW architectures, Case study :The Trace 200 family.
Superscalar Processors : Processing of Control Transfer Instructions: introduction, Basic approaches to branch handling, Delayed braching, Branch processing, Multiway braching, Guarded execution.,
Code Scheduling for ILP-Processors: Introduction, Basic block scheduling, Loop scheduling, Global scheduling.

UNIT –III

Introduction to Data-Parallel Architectures: Introduction, connectivity, Alternative architectural classes,
SIMD Architectures: Introduction, design space, Fine-grained SIMD architectures, Coarse-grained SIMD architectures,
Associative and Neural Architectures: Introduction, Associative processing, An example the associative string processor, Application array mapping, Neural computers.

UNIT-IV

Data-Parallel Pipelined and Systolic Architectures: Introduction, Pipelines, Systolic architectures,
Vector Architectures: Introduction, word length, vectorization, pipelining, parallel computing streams, technology, the Cray family, The Convex C4/XA system,

Introduction to MIMD Architectures: Architectural concepts, Problems of scalable computers, Main design issues of scalable MIMD computers.

UNIT –V

Multi-threaded Architectures: Introduction, computational models, von Neumann-based multi threaded architectures, dataflow architectures, Hybrid multi-threaded architectures, *Distributed Memory MIMD Architectures*: Introduction, direct interconnection networks, Fine-grain systems, Medium grain systems, Coarse-grain multicomputers,
Shared Memory MIMD Architectures : Introduction, Dynamic interconnection networks, Cache coherence, Synchronization and event ordering in multi-processors, UMA, NUMA, CC_NUMA, COMA machines,
Outlook: Introduction, Semiconductor technology, Interconnection technology, Optical computing, Bio-electronic computing, future directions.

Suggested Readings:

1. Sima, Fountain, Kacsuk, "Advanced Computer Architectures: A design space approach", Pearson Education, 2004
2. Richard Y. Kain, "Advanced Computer Architecture: A Systems Design Approach", Prentice Hall India, 2005.
3. David E. Culler, Jaswinder Pal Singh and Anoop Gupta, "Parallel Computer Architecture: A hardware software approach", Morgan Kaufmann publishers, 2009.

References:

1. Kai Hwang , "Advanced Computer Architecture", Mc Graw Hill, 1999.
2. John L.Hennessy & david A Patterson, "Computer architecture A Quantitative Approach", Morgan Kaufmann Publishers, Inc, 1996.

CS-431

DISTRIBUTED SYSTEMS LAB

Instruction	3Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	

1. Develop an FTP Client. Provide a GUI interface for the access of all the services.
2. Implement a mini DNS protocol using RPC.
3. Implement a chat server using JAVA.
4. Implement a 2PC for distributed transaction management.
5. Study of NFS.

CS-432

EMBEDDED SYSTEMS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

A Use of 8-bit and 32-bit Microcontrollers, (such as 8051 Microcontroller, ARM2148 / ARM2378, LPC 2141/42/44/46/48) Microcontroller and C compiler (Keil, Ride etc.) to:

1. Interface Input-Output and other units such as:
   Relays, LEDs, LCDs, Switches, Keypads, Stepper Motors, Sensors, ADCs, Timers
2. Demonstrate Communications:
   RS232, IIC and CAN protocols
3. Develop Control Applications such as:
   Temperature Controller, Elevator Controller, Traffic Controller

B. Development of Embedded Application using FPGAs, CPLDs, VHDL and Xilinx Programmable Logic Design Tools:

1. Four bit ALU
2. Pseudo Random Number Generator

C. Development and Porting of Real Time Applications on to Target machines such as Intel or other Computers using any RTOS

I. Understanding Real Time Concepts using any RTOS through Demonstration of:

1. Timing
2. Multi-Tasking
3. Semaphores
4. Message Queues
5. Round-Robin Task Scheduling
6. Preemptive Priority based Task Scheduling
7. Priority Inversion
8. Signals
9. Interrupt Service Routines

II. Application Development using any RTOS:

1. Any RTOS Booting
2. Application Development under any RTOS

CS-433

COMPILER CONSTRUCTION LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

1&2	Scanner stand alone program
3&4	Scanner program using Lex
5	SLR parser generation
6	LR parser generation
7&8	Parser generation using Yacc
9&10	Code generation
11&12	Code optimization

CS 434

PROJECT SEMINAR

Instruction 3 Periods per week
Sessional 25 Marks

Oral presentation is an important aspect of engineering education. The objective of the Seminar is to prepare the student for a systematic and independent study of the state of the art topics in a broad area of his/her specialization.

Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to the following aspects of a seminar presentation.

- Literature Survey
- Organization of the material
- Presentation of OHP slides/PC presentation
- Technical writing

Each student is required to:

1. Submit a one page synopsis before the seminar talk for display on the notice board
2. Give a 20 minutes presentation through OHP, PC, Slide projector followed by a 10 minute discussion.
3. Submit a report on the seminar topic with a list of reference and slides used.

Seminars are to be scheduled from the 3rd week to the last week of semester and any change in schedule should be discouraged. For award of Sessional marks students are to be judged by at least two faculty members on the basis of an oral and written presentation as well as their involvement in the discussions