WITH EFFECT FROM ACADEMIC YEAR 2015-16

Syllabus of B.E. III YEAR
OF
FOUR YEAR DEGREE COURSE
IN

COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)
Hyderabad – 500 075

Chaitanya Bharathi Institute of Technology (AUTONOMOUS)

SCHEME OF INSTRUCTION & EXAMINATION
B.E. III - year
COMPUTER SCIENCE & ENGINEERING

SEMESTER-I

Sl.No	Syllabus Ref. No	SUBJECT	Scheme of Instructions		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Uni. Exam	Sessionals	
THEORY								
1	CS 311	Automata Languages and Computation	4	-	3	75	25	3
2	CS 312	Design and Analysis of Algorithms	4	-	3	75	25	3
3	CS 313	Embedded Systems	4	-	3	75	25	3
4	CS 314	Database Management Systems	4	-	3	75	25	3
5	CS 315	Operating Systems	4	-	3	75	25	3
6	CE 444	Human Values and Professional Ethics	2*	-	2	50	-	-
PRACTICALS								
6	CS 316	Embedded Systems Lab	-	3	3	50	25	2
7	CS 317	Database Management Systems Lab	-	3	3	50	25	2
8	CS 318	Operating Systems Lab	-	3	3	50	25	2
9	EG 221	Soft Skills and Employability Enhancement	-	2	2	50	25	1
		TOTAL	**22**	**11**	-	**625**	**225**	**22**

*21 Periods per semester

WITH EFFECT FROM ACADEMIC YEAR 2015-16

Chaitanya Bharathi Institute of Technology (AUTONOMOUS)

SCHEME OF INSTRUCTION & EXAMINATION
B.E - III Year
COMPUTER SCIENCE & ENGINEERING

SEMESTER-II

	Syllabus Ref. No	SUBJECT	Scheme of Instructions		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Uni. Exam	Sessionals	
THEORY								
1	CS 321	Compiler Construction	4	-	3	75	25	3
2	CS 322	Software Engineering	4	-	3	75	25	3
3	CS 323	Web Technologies	4	-	3	75	25	3
4	CS 324	Computer Networks	4	-	3	75	25	3
5		Elective-I	4	-	3	75	25	3
PRACTICALS								
6	CS 326	Web Technologies Lab (Mini Project)	-	3	3	50	25	2
7	CS 327	Compiler Construction Lab	-	3	3	50	25	2
8	CS 328	Computer Networks Lab	-	3	3	50	25	2
9		Industrial Visit	-	14 Periods /Sem	-	-	-	-
		TOTAL	**20**	**9**	**-**	**525**	**200**	**21**

Elective-I:

CS 351 - Information Storage Management
CS 352 - Image Processing
CS 353 - Advanced Computer Architecture
CS 354 - Simulation and Modeling
CS 355 - Realtime Systems
CS 356 - Soft Computing

CS 311

AUTOMATA LANGUAGES AND COMPUTATION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To introduce the students to the theoretical concepts of computer science
2. To know the various languages and grammars that are associated with various recognizers.
3. To understand the language by considering the idea of a decision problem
4. To understand language recognition problem and different classes of a problem

Course Outcomes:

1. Analyze the core concepts in automata theory and formal languages.
2. Design grammars and automata (recognizers) for different language classes.
3. Identify formal language classes and prove language membership properties.
4. Prove and disprove theorems establishing key properties of formal languages and computational models including (but not limited to) decidability and intractability.

UNIT-I

Automata: Introduction to Chomsky Hierarchy, Finite Automata, Central Concepts of Automata Theory. Finite Automata: An Informal Picture of Finite Automata, Deterministic Finite Automata, Non-deterministic Finite Automata, An Application, Finite Automata with Epsilon Transitions

UNIT-II

Regular expressions & Languages: Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions.
Properties of Regular Languages: Proving Languages not to be Regular, Closure properties of Regular Languages, Decision Properties of Regular Languages, Decision Properties of Regular Language, Equivalence and Minimization of Automata.

UNIT-III

Context Free Grammars and Languages: Context free grammars, Parses Trees, Right Linear and Left Linear Grammars Applications, Ambiguity in Grammars and Languages. Pushdown Automata: Definition, Languages of PDA, Equivalence of PDA'sand CFG's Deterministic Pushdown Automata.**Properties of Context Free Languages:** Normal Forms for ContextFree Grammars, Pumping Lemma.

UNIT-IV

Introduction to Turing Machines: Problems that Computers cannotSolve, The Turing machines, Programming Techniques for Turing Machines,Extensions to the Turing 4 Machines Restricted Turing Machines, Turingmachines and Computers.

UNIT-V

Un-decidability: A language that is not Recursively Enumerable, Anundecidable problem that is RE, Undecidable problems about TuringMachines, Post's Correspondence Problem, Other Undecidable Problems.**Intactable Problems:** The Classes P and NP, an NP Complete Problem, A Restricted Satisfiability problem.

Text Books:

1. John. E. Hopcroft, Rajeev Motwani, Jeffery, D. Ulman, "Introductionto Automata Theory, Languages and Computation", 3rd edition,Pearson Education-2007.
2. John C.Martin, "Introduction to Languages and the Theory ofComputation", 3rd edition Tata McGraw Hill, 2003.

Suggested Readings:

1. -Mishra and Chandrashekaran, "Theory of Computer Science – Automata languages and computation", 2nd edition, PHI.

CS 312

DESIGN AND ANALYSIS OF ALGORITHMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To provide an introduction to formalisms, understand, analyze and denote time complexities of algorithms.
2. To introduce the different algorithmic approaches for problem solving through numerous example problems.
3. To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness.

Course Outcomes:

1. Students will be able to develop an overall understanding of the performance of algorithms.
2. Students will be able to analyse and determine an algorithm's time complexity.
3. Students will be able to devise an appropriate algorithm for real world problem, using one of the algorithmic approaches.

UNIT-I

Introduction, Algorithm Specification, Performance analysis, SpaceComplexity, Time Complexity, Asymptotic Notation(O,Omega, Theta),Practical Complexities, Performance Measurement, Review of elementary data structures- Heap and Heap Sort, Hashing, Set representation: UNION and FIND.

UNIT-II

Divide-and Conquer: The general method, finding maximum and minimum, Merge sort, quick sort and selection. **Greedy Method:** Knapsack problem, Optimal Storage on tapes, Job sequencing with deadlines, Optimal merge patterns, Minimum Spanning Trees.

UNIT-III

Dynamic Programming And Traversal Techniques: Multistage graph, All Pair Shortest Paths, Optimal Binary Search trees,0/1 Knapsack, Reliability Design, Travelling Salesman Problem, BFS and Depth First Search: Applications of BFS and DFS. Bi-Connected components, transitive closure, topological sorting, strongly connected components.

UNIT-IV

Backtracking and Branch and Bound: 8-Queens Problem, Graph Coloring, Hamiltonian cycle, 0/1 Knapsack Problem, Traveling salesperson problem. Lower-Bound Theory.

UNIT-V

NP-Completeness: Basic concepts, Polynomial time, polynomial time verification, reducibility, **NP-complete problems:** The clique problem, the vertex-cover problem, the Hamiltonian cycle problem, the traveling salesman problem and the subset sum problem.

Text Books:

1. Horowitz E.,Sahani S, “Fundamentals of Computer Algorithms”,Galgotia Publications.
2. Cormen, Leiserson, Rivest,Stein, “Introduction to Algorithms”, Second Edition, PHI Learning.

Suggested Reading:

1. Aho, Hopcroft, Ulman, "The Design and Analysis of Computer Algorithms", Pearson Education, 2000.

CS 313

EMBEDDED SYSTEMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Emphasis on hardware and software in the design and development of Embedded Systems.
2. To study the principles and concepts of Embedded System architecture, hardware design and development.
3. The concepts and theory necessary to understand and program Distributed Embedded real-time systems.
4. The concepts of RTOS and various issues involved in Real Time Operating System.

Course Outcomes:

1. Analyze the core concepts of Embedded System and Embedded System Architecture.
2. Design and develop Embedded System hardware and software using Embedded C.
3. Analyze the operating system for Embedded Systems and Embedded System development environment.

UNIT – I

Introduction to Embedded Systems: Embedded Systems, Processor embedded into a system, Embedded hardware units and devices in a system, Embedded software in a system, Examples of embedded systems, Design process in Embedded system, Formalization of system design, Design process and design examples(smart card, digital camera, mobile phone), Classification of Embedded Systems, Skills required for embedded system designer.

UNIT-II

Programming concepts and Embedded programming in C: Software programming in Assembly language and in high level language C, C program elements: Header and source files, preprocessor directives, program elements, macros and functions, program elements: data types, data structures, modifiers, statements, loops and pointers.

Interprocess communication and synchronization of processes, Threads and Tasks.

Multiple processes in an application, Multiple threads in an application, Tasks , Task states, Task and data, Clear cut distinction between functions, ISRs and tasks and their characteristics.

Concept of semaphores, Shared data, Interprocess communication, Signal function, Semaphore functions, Message queue functions, Mailbox functions, Pipe functions, Socket functions, RPC functions.

UNIT-III

Real time operating systems: OS services, Process management, Timer functions, Event functions, Memory management, Device, File, IO subsystems management, Interrupt routine in RTOS environment and handling of Interrupt source calls, RTOS, RTOS task scheduling models, Interrupt latency, Response of tasks as performance metrics, OS security issues.

UNIT-IV

8051 interfacing with displays (LED, 7 segment display, LCD), Switch, Relay , Buzzer, D/A and A/D converters, Stepper motor.

Real time OS programming-I: Micro C/OS –II and Vx works, Basic functions and types of RTOSes, RTOS Micro COS-II, RTOS Vxworks, Basic features.

Networked Embedded systems, Serial communication protocols , I2C bus, CAN bus, RS232, Introduction to advanced architectures: ARM and SHARC .

UNIT-V

Embedded software Development process tools: Introduction to embedded software development process and tools, Host and Target machines, Linking and locating software, Getting embedded software into target system, Issues in hardware - software design and Co-design.

Testing, simulation and debugging techniques and tools: Testing on host machine, Simulators, Laboratory tools

Text Books:

1. Raj Kamal, "Embedded Systems: Architecture, Programming And Design", Second Edition 2008, The McGraw-Hill Companies.

Suggested Reading:

1. David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.
2. Wayne Wolf , "Computers as Components: Principles of Embedded Computing System Design", Elsevier, 2008.

CS 314

DATABASE MANAGEMENT SYSTEMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To familiar with fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
2. To understand about data storage techniques and indexing.
3. To impart knowledge in transaction Management, concurrency control techniques and recovery procedures.

Course Outcomes:

1. Students will be able to develop the knowledge of fundamental concepts of database management
2. Students will be able to apply the concepts like data storage and indexing.
3. Students will be able to implement the knowledge about transaction management, concurrency control and recovery of database systems.

UNIT-I

Introduction : Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Specialty Databases, Data Storage and Querying, Database Users and Administrators Database System Architecture, Application Architectures.

Database Design and E-R Model: Overview of the Design Process, Data Models, The E-R Model, Constraints, E-R Diagrams, E-R Design Issues, Extended E-R Features, Reduction to Relation Schemas, Other Aspects of Database Design.

UNIT-II

Relational Model: Structure of Relational Databases, Database Schema, Keys, Relational Algebra, Fundamental Operations, Additional Relational Algebra Operations, Extended Relational Algebra Operations, Modification of the Database.

Structured Query Language: Overviews, SQL Data Types, Basic Structure of SQL Queries, Modification of the Database, Set Operations, Aggregate Functions, Data-Definition Language, Integrity Constraints, Null Values, Nested Sub queries, Views, Join Expression. Triggers, Index Definition in SQL, Procedures and Functions in SQL, Recursive Queries, JDBC,ODBC, Embedded SQL.

UNIT-III

Relational Database Design: Undesirable Properties in Relational Database Design, Functional Dependencies, Basic Definitions, Trivial and Nontrivial Dependencies, Closure of Set of Functional Dependencies, Closure of Set of Attributes, Irreducible Set of Functional Dependencies, Non-loss Decomposition and Functional Dependencies, Normalization – 1NF,

2NF, and 3NF, Dependency Preservation, BCNF, Comparison of BCNF and 3NF, Multi-valued Dependencies and 4NF, Join Dependencies and 5NF.
Indexing: Overview of Indexes, Properties of Indexes, Tree-Structured Indexing, Indexed Sequential Access Method (ISAM), B+ Tree Index Files, Bitmap Indices.

UNIT-IV
Hashing: Static Hashing, Dynamic Hashing - Extendible Hashing, Linear Hashing.
Transaction Management and Concurrency Control: Transaction Concept – ACID Properties, States of Transaction, Implementation of Atomicity and Durability, Concurrent Executions - Serializability, Recoverability, Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularity.

UNIT-V
Deadlocks: Deadlock Prevention, Deadlock Detection, Performance of Lock-Based Concurrency Control, Specialized Locking Techniques - Dynamic Databases and the Phantom Problem.
Recovery System: Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery, Buffer Management, Failure with Loss of Nonvolatile Storage, ARIES Recovery Method, Remote Backup Systems.

Text Books:

1. Abraham Silberschatz, Henry F Korth, S Sudarshan, " Database System Concepts", Sixth Edition, McGraw-Hill International Edition, 2011
2. Date CJ, Kannan A, Swamynathan S, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.

Suggested Reading:

1. Raghu Ramakrishnan, JohnnesGehrke, "Database Management Systems" ,Third Edition, McGraw Hill,2003.
2. RamezElmasri, Durvasul V L N Somayazulu, Shamkant B Navathe, Shyam K Gupta, "Fundamentals of Database Systems", Fourth Edition, Pearson Education,2006.

CS 315

OPERATING SYSTEMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To understand the services an operating system provides to users, processes and other systems
2. To understand how to manage various resources like CPU, Memory, Files and I/O.
3. To understand Process Synchronization, multiprogramming, Deadlocks.
4. To understand the Architecture and implementation of different operating systems.

Course Outcomes:

1. Students will be able to develop the knowledge of the role of operating system and its design.
2. Students will be able to implement the knowledge of multiprogramming, multithreading, deadlocks.
3. Students will be able to analyse the concept of IPC
4. Students will be able to realize the concept of I/O, file management and possess the knowledge about new evolving operating systems and their features.

UNIT-I

Introduction: What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations

Operating-System Structures: Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation Operating-System Structure, Virtual Machines, Operating-System Debugging Operating-System Generation System Boot.

UNIT-II

Process Management: Processes, Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication, Examples of IPC Systems , Communication in Client – Server Systems.

Threads Overview, Multithreading Models, Threading Issues

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms,Thread Scheduling, Multiple-Processor Scheduling.

Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization , Synchronization Examples , Atomic Transactions.

UNIT-III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

MEMORY MANAGEMENT: Main Memory, Background, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.
Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory.

UNIT-IV
File-System Interface: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection
File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance Recovery.
Mass-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure, Stable-Storage Implementation, Tertiary-Storage Structure

UNIT-V
I/O Systems: Overview, I/O Hardware, Application I/O Interface, Transforming I/O Requests to Hardware Operations
Protection and Security: Protection, Goals of Protection, Principles of Protection , Domain of Protection,Access Matrix, Implementation of Access Matrix, Access Control , Revocation of Access Rights, Capability-Based Systems , Language-Based Protection
Security: The Security Problem , Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication , Implementing Security Defenses , Firewalling to Protect Systems and Networks, Computer-Security Classifications

Text Books:

1. Avi Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System-Concepts", John Wiley & sons, Eighth Edition, 2008
2. Andrew S.Tanenbaum, "Modern Operating Systems", Third Edition, Pearson education, Asia-2008

Suggested Reading:

1. W.Richard Stevens; Stephen A.Rago, "Advanced Programming in the UNIX Environment", Third Edition, Addison-Wesley professional Publication Date:14-MAY-2013

CE 444

HUMAN VALUES AND PROFESSIONAL ETHICS

Instruction	21L Periods per semester (7 * 3)
Duration of University Examination	2 Hours
University Examination	50 Marks
Sessionals	-
Credits	-

Course Objectives:

1. To develop the critical ability among students to distinguish between what is of value and what is superficial in life
2. To enable the students understand the values, the need for value adoption and prepare them meet the challenges
3. To enable the students develop the potential to adopt values, develop a good character and personality and lead a happy life
4. To motivate the students practice the values in life and contribute for the society around them and for the development of the institutions /organization around they are in.
5. To make the students understand the professional ethics and their applications to engineering profession

Course Outcomes:

1. Students develop the capability of shaping themselves into outstanding personalities, through a value based life.
2. Students turn themselves into champions of their lives.
3. Students take things positively, convert everything into happiness and contribute for the happiness of others.
4. Students become potential sources for contributing to the development of the society around them and institutions / organisations they work in.
5. Students shape themselves into valuable professionals, follow professional ethics and are able to solve their ethical dilemmas.

UNIT-I

Concepts and Classification of Values –Need and challenges for value Adoption Definition of Values – Concept of Values – Classification of Values – Hierarchy of Values – Types of values –Espoused and Applied Values – Value judgement based on Culture – Value judgement based on Tradition – Interdependence of Values.

Need for value education – Findings of Commissions and Committees - Corruption and illegal practices – Science and Technology without values- Exploitation of nature – Increasing use of violence and intoxicants – Lack of education in values – Implications of education in values – Vision for a better India.

Challenges for Value adoption – Cultural, Social, Religious, Intellectual and Personal challenges.

UNIT-II

Personal Development and Values in Life

Personal Development: Enlightened self-interest – Accountability and responsibility – Desires and weaknesses – Character development – Good relationships, self-restraint, Spirituality and Purity – The quest for Character – Tests of Character – The key to good character.
Values in Life: Building an ethical policy – Integrating values in everyday life – Archaic Social Values – Parenting practices – Critical Thinking - Analyzing and Prioritizing values – Practicing Yoga and Meditation

UNIT-III

Practicing Values for the development of Society

Resentment Management and Self-analysis – Positive Thinking and Emotional Maturity – The importance of Women , Children and Taking care of them – Helping the poor and needy – Fighting against addictions and atrocities – Environmental awareness – Working for the Sustainable development of the society.
Values in Education system: Present Scenario- Engineering education –Current trends- Need for quality improvement- Adoption of value education – Principles of Integrity-Institutional Development.

UNIT-IV

Basic Concepts of Professional Ethics

Ethics, Morals and Human life , Types of Ethics, Personal Ethics, Professional ethics, Ethical dilemmas, Indian and Global thoughts on ethics, Profession, Professional and Professionalism, Ethical role of a professional Basic ethical principles, Some basic ethical theories, use of ethical theories.
Science, Religion Ethics, Genders and ethics, Media and ethics, Computer Ethics, Case Studies on Professional Ethics, Exemplary life sketches of prominent Indian personalities

UNIT-V

Ethics in engineering profession

Engineering profession-Technology and Society-Engineering as Social Experimentation-Engineering ethics-Ethical obligations of Engineering Professionals-Role of Engineers-Engineers as Managers-Professional responsibilities of Engineers- Engineers Responsibility for Safety- A few Case Studies on Risk management
Conflicts of Interest- Occupational Crimes- Plagiarism-Self plagiarism-Ethics Audit-Consideration for ethics audit-Ethics Standards and Bench Marking

Text Books:

1. Subramanian R., "Professional Ethics" , Oxford University Press , 2013
2. Nagarajan R.S., "A Text Book on Human Values and Professional Ethics" New Age Publications, 2007
3. Dinesh Babu S., "Professional Ethics and Human Values" , Laxmi Publications , 2007

Suggested Readings:

1. Santosh Ajmera and Nanda Kishore Reddy "Ethics, Integrity and Aptitude", McGrawhill Education Private Limited , 2014
2. Govinda Rajan M., Natarajan S., Senthil Kumar V.S. "Professional Ethics and Human Values" Prentice Hall India Private Limited, 2012
3. Course Material for Post Graduate Diploma In "Value Education & Spirituality" Prepared by Annamalai University in Collaboration with Brahma Kumaris, 2010

CS 316

EMBEDDED SYSTEMS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Understanding of Embedded Systems and learn programming in Embedded C.
2. To analyze and design various Microcontroller applications and interfacing.
3. Understanding and analyzing RTOS characteristics.
4. To learn how to write simple applications using RTOS.

Course Outcomes:

1. Apply knowledge of 8051 microcontroller and interface with various devices.
2. Demonstrate serial communication using IIC protocol.
3. Develop RTOS programs to implement various applications.
4. Learn to integrate hardware and software to come up with an Embedded System.

Using 8 bit microcontroller, following programs have to be tested on 89C51 Development board/equivalent using Embedded C Language on RIDE IDE and Proload or Equivalent.

A) Interface Input, Output and other units such as: Relays, LEDs, LCDs, Switches, Keypads, Stepper Motor, Sensors, ADC, DAC, Timers:

1. Program to interface a Leds, Buzzer and Switch to different pins of a Port such that the buzzer and leds should work as long as the switch is pressed.
2. Program to interface relay
3. Program to interface LCD in four bit mode and 8 bit mode to display message on it.
4. Program to interface Seven Segment display unit.
5. Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions.
6. Program to illustrate timer interrupt.
7. Program to implement Analog to Digital conversion using ADC0808 and Digital to Analog conversion using DAC0808.

B) Demonstrate Communications using IIC protocol:

8. Program to interface Real Time Clock and EEPROM using software implemented IIC protocol

RTOS: Understanding Real Time Concepts using any RTOS through demonstration of:

9. Program to create Tasks.
10. Program to illustrate producer consumer problem using Semaphores.
11. Program to illustrate Queues.
12. Program to illustrate Timer.

Suggested Readings:

1. Wayne Wolf , “Computers as Components: Principles of Embedded Computing System Design”, Elsevier, 2008.

CS 317

DATABASE MANAGEMENT SYSTEMS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1 To familiar with the concepts of structured query language.
2 To understand about programming language/ structured query language (PL/SQL).
3 To familiar with generation of form and open database connectivity.

Course Outcomes:

1 Students will be able to develop the knowledge of structured query language concepts.
2 Students will be able to Implement the concepts of PL/SQL.
3 Students will be able to design GUI using forms and implement database connectivity.

List of Experiments:

SQL

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
2. Queries using operators in SQL
3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update
4. Queries using Group By, Order By, and Having Clauses
5. Queries on Controlling Data: Commit, Rollback, and Save point
6. Queries to Build Report in SQL *PLUS
7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints
8. Queries on Joins and Correlated Sub-Queries
9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

PL/SQL

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation
11. Write a PL/SQL Code Bind and Substitution Variables.
    Printing in PL/SQL
12. Write a PL/SQL block using SQL and Control Structures in PL/SQL
13. Write a PL/SQL Code using Cursors, Exceptionsand Composite Data Types
14. Write a PL/SQL Code using Procedures, Functions, and Packages

FORMS

15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc.

16. Demonstration of database connectivity

Note: The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

Text Books/Suggested Reading:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, "Database Systems Using Oracle", PHI,2007.
3. Rick F Van der Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007.

CS 318

OPERATING SYSTEMS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. To understand the design aspects of operating system.
2. To design and apply the process management concepts.
3. To design and apply the storage management concepts.

Course Outcome:

1. Students will be able to use Unix utilities and perform basic shell control of the utilities
2. Students will be able to use the Unix file system and file access control.
3. Students will be able to write programs systems based on multiple cooperating processes or threads
4. Students will be able to implement process scheduling, synchronization and memory management algorithms.

List of experiments:

1. Programs using LINUX shell scripts.
2. Programs using process related system calls.
3. Programs to illustrate threads
4. Implement CPU scheduling algorithms (a) Round Robin (b) SJF (c) FCFS
5. Echo server using pipes
6. Echo server using messages
7. Producer- Consumer problem using shared memory.
8. Dining philosopher problem using semaphore
9. Implement page replacement algorithms (a) FIFO (b) LRU
10. Bankers algorithm for Deadlock detection and avoidance
11. Programs to illustrate different file related System calls.
12. Printing file flags for specified descriptor.

Suggested Reading:

1. Deitel and Deitel, "Operating System", Pearson Education, New Delhi, Third Edition, 2007.

EG 221

SOFT SKILLS AND EMPLOYABILITY ENHANCEMENT

Instruction	2 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	1

Course Objectives: To help the students

1. Participate in group discussions with confidence and to make effective presentations. Also to learn the art of communication.
2. With-resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management & goal setting, self confidence and assertiveness.
4. Understand what constitutes proper grooming and etiquette in a professional environment. Also to understand academic ethics and value systems.

Course Outcomes: Student will be able to

1. Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to manage time effectively and deal with stress.
4. Make the transition smoothly from campus to corporate. Also use media with etiquette and know what academic ethics are.

Exercise 1

Communicative Competence –The Art of Communication, basic grammar, Indianisms, Effective listening skills, using English in different situations

Exercise 2

Group Discussion –dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence

Elements of effective presentation –Structure of presentation –Presentation tools –Body language Creating an effective PPT

Exercise 3

Interview Skills –Resume' writing –structure and presentation, planning, defining the career objective, projecting ones strengths and skill – sets Interview Skills –concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews

Exercise 4
Personality Development –Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values.

Exercise 5
Corporate Culture –Grooming and etiquette, communication media etiquette Academic ethics and integrity

Text Books/Suggested Reading:

1. Madhavi Apte , "A Course in English communication", Prentice - Hall of India, 2007
2. LeenaSen , "Communication Skills", Prentice Hall of India, 2005
3. Dr. Shalini Verma, "Body Language - Your Success Mantra", S Chand, 2006
4. Edgar Thorpe and Showick Thorpe , "Objective English", 2nd edition, Pearson Education, 2007
5. Ramesh, Gopalswamy, and Mahadevan Ramesh, "The ACE of Soft Skills", New Delhi: Pearson, 2010
6. Gulati and Sarvesh, " Corporate Soft Skills", New Delhi: Rupa and Co. , 2006
7. Van Emden, Joan, and Lucinda Becker, "Presentation Skills for Students", New York: Palgrave Macmillan, 2004
8. Covey and Stephen R, "The Habits of Highly Effective People", New York: Free Press, 1989.

II-SEMESTER

CS 321

COMPILER CONSTRUCTION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives :

1. To implement the concept learned in automata theory and languages to the field of Computer Science.
2. To understand the processes involved in converting a source language to target code
3. To expose the students to the analysis and synthesis phases of compilation
4. To build a compiler at the end of the course

Course Outcomes:

1. Design & implement a software system for the compiler.
2. Deal with different translators.
3. Apply the knowledge of lex tool &yacc tool to develop a scanner & parser.
4. Design & conduct experiments for analysis and synthesis phases of compilation.

UNIT-I

Introduction – Programs related to compilers. Translation process.Majordata structures.Other issues in compiler structure. Boot strapping andporting.**Lexical analysis** – The role of Lexical Analyzer.Input Buffering.Specification of Tokens.Recognition of Tokens.The Lexical-AnalyzerGenerator Lex.

UNIT-II

Syntax Analysis – Introduction. Top-Down parsing, Brute Forcing,Recursive Descent, Predicative LL(1), Bottom-Up parsing : Introductionto LR Parsing, Powerful LR parsers SLR, CALR, LALR, UsingAmbiguous Grammars, Parser Generators - Yacc.

UNIT-III

Syntax Directed Translation – Syntax Directed Definitions. EvaluationOrders for SDDs. Applications of Syntax Directed Translation.

Symbol Table Organization - Structure of Symbol table, Symbol Tableorganization for Block Structured and non-block Structure languages, Data
Structures of symbol Table.

UNIT-IV

Intermediate code generation : Variants of syntax trees. Three-AddressCode, Types and Declarations.Translation of Expressions.Type Checking.Control Flow.

Storage Organization. Stack Allocation of Space. Access to Non localData on the Stack.Heap Management.Introduction to GarbageCollection.

UNIT-V

Code Generation – Issues in the Design of a Code Generator.TheTarget Language. Addresses in the Target Code Basic Blocks and FlowGraphs. Optimization of Basic Blocks.Peephole Optimization. RegisterAllocation and Assignment. Machine Independent Optimizations – ThePrincipal Sources of Optimizations, Introduction to data flow analysis,Foundation of data flow analysis.

Error Recovery : Introduction, Error detecting and Reporting in variousPhases, Lexical Errors, Syntax Errors handling, and error Recovery invarious Phases.

Text Books:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman, "Compilers: Principles Techniques & Tools", Pearson Education2nd Edition 2007.
2. Keith D Cooper & Linda Tarezon, "Engineering a Compiler", MorganKafman, Second edition.Lex&Yacc, John R Levine, Tony Mason, Doug Brown, ShroffPublishers.

Suggested Reading:

1. Kenneth C Louden, "Compiler Construction: Principles andPractice", Cengage Learning. Lex&Yacc, John R Levine, Oreilly Publishers.

CS 322

SOFTWARE ENGINEERING

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To familiarize students with software development process.
2. To learn software quality assessment.
3. To learn testing for optimum functionality at reasonable cost.
4. To understand the merits and demerits of different approaches in software engineering.

Course Outcomes:

After completion of this course, student will be able to

1. Analyze various software engineering models and patterns generally used.
2. Choose the best model for the project based on the type of project.
3. Perform quality assessment testing on the software and measure the quality using various metrics.
4. Perform testing through various techniques to make sure the software project is optimal and to achieve this at a reasonable cost.

UNIT –I

Introduction to Software Engineering: Theevolvingrole of Software, changing nature of Software, Software Myths .

Generic view of Process: Software Engineering, Process Framework, CMMI, Process Patterns, Process Assessment, Personal and Team Process, Process Technology, Product and process.

Process Models: Perspective Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process.

An Agile View of Process: What is Agility, Agile Process, and Agile Process Models.

UNIT-II

Requirement Engineering: A bridge to design and construction, Requirement Engineering tasks, Initiating Requirement Engineering Process, Eliciting Requirement, Developing Uses cases, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

Planning and Managing the Project: Tracking Progress, Project Personnel, Effort Estimation, Risk Management, the Project Plan, Process Models and Project Management.

UNIT-III

Building the Analysis and Design Model: Requirements Analysis Modeling approaches, Data modeling concepts, Object oriented analysis , Scenario based modeling, Flow oriented modeling, Class-based modeling, Creating a Behavioral Modeling. Design within the context of SE, Design Process and Design quality, Design concepts, The Design Model, Pattern-based Software Design.

Creating Architectural Design: Software architecture, Data design, Architectural Styles and Patterns, Architectural Design.

UNIT-IV

Modeling Component-Level Design: What is a Component, Designing Class-Based components, Conducting Component–level Design, Object Constraint Language, Designing Conventional Components.

Performing User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

Implementation: Coding Principles and Standards, Coding Process, Code Verification .

UNIT-V

Testing Strategies: A Strategic approach to software testing, strategic issues, test strategies for O-O software, validation testing, system testing, art of debugging.

Testing Tactics: Software Testing Fundamentals, Black-Box and white box Testing, basis path testing, Control Structure Testing, O-O Testing methods.

Product Metrics: Software quality, A framework for product metrics, Metrics for the analysis model, metrics for the Design model, metrics for source code, Metrics for Testing.

Software Maintenance: Categories of Maintenance, Maintenance Process models,Software reuse, Metrics for maintenance.

Text Books:

1. Roger S. Pressman, "Software Engineering –A Practitioners Approach", 7th Edition, Pearson Education, India, 2010.
2. Shari Lawrence Pfleeger, "Software Engineering Theory and Practices" 4th Edition - Pearson Education, India, 2011.

Suggested Reading:

1. UgrasenSuman"Software Engineering concepts and Practices", Cengage Learning,2013.

CS 323

WEB TECHNOLOGIES

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To acquire knowledge ofXHTML,Java Script and XML to develop web applications
2. Ability to develop dynamic web content using Java Servlets and JSP
3. To understand JDBC connections and Java Mail API
4. To understand the design and development process of a complete web application

Course Outcomes:

1. Students will be able to develop static web sites using XHTML and Java Scripts
2. To implement XML and XSLT for web applications
3. Develop Dynamic web content using Java Servlets and JSP
4. To develop JDBC connections and implement a complete Dynamic web application

UNIT-I

Web Basics and Overview: Introduction to Internet, World Wide Web, URL, MIME, HTTP Introduction and basics of XHTML, Cascading Style Sheets, Basics of JavaScript

UNIT-II

Event handling and Dynamic Documentation with Java Scripts
Introduction to XML, XML document structure, DTD, namespaces, Schemas. XSLT style sheets, XML Processors.

UNIT-III

J2EE Platform: Enterprise Architecture Styles, Containers and Technologies
Servlet Programming: Overview of Java Servlet API, Servlet Implementation, Servlet Configuration, Servlet Exceptions, Servlet Life cycle, Request and Responses.
Introduction to Web containers: Web Application Structure, Mapping requests to Applications and Servlets, Securing web Applications and Deployment configuration
Servlet Sessions, Context and Collaboration: Approaches to Session tracking, Session Tracking with java servlet API, Servlet Context, Servlet Collaboration.

UNIT-IV

Filters for web applications: Introduction to filters, filter API, Deployment descriptor for filters, chat applications with filters.
JSP Basics: Introduction to JSP, Directives, Scripting Elements, Standard Objects, Design Strategies.
JSP Tag extensions: Tag extensions, A simple Tag Anatomy of a Tag extension, Writing Tag Extensions, Application Life Cycle Events.

UNIT-V

Java Database Connection: Introduction to JDBC, Database Drivers, Interfaces and classes of java.sql package. Retrieving Meta information from database and ResultSet, JDBC Data Sources, Connection pooling, Distributed transactions and RowSet objects.

Java Mail: Mail Protocols, Overview, Installation and Configuration,API ,Working with Mail and Resources.

Text Books:

1 SubramanyamAllamraju, "Professional Java Server programming", J2EE 1.3 Edition, CeditBuest, Apress Publications.

2 Robert W Sebesta, "Programming the World Wide Web", Pearson Education

Suggested Reading:

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2010.

CS 324

COMPUTER NETWORKS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Understanding the concepts of network reference models
2. Analysis of Routing algorithms and congestion algorithms
3. Functionality of the transport layer
4. Basics of cryptography and different application layer protocols

Course Outcomes:

After completion of this course, student will be able to

1. Deter main the ISO-OSI and TCP/IP Models
2. Design applications using internet protocols
3. Implement routing and congestion control algorithms
4. Develop application layer protocols

UNIT-I

Introduction: Network Architecture, Protocol implementation issues, Quantitative performance metrics, Network Design, Reference Models- ISO-OSI and TCP/IP, Comparison of the OSI and TCP/IP models.

UNIT-II

Network Layer: Network layer design issues, Routing Algorithms, Congestion Control Algorithms

Internetworking: The network layer in the internet, Internet Protocol (IP), Unicast, Multicast, and inter Domain Routing, QOS in IP.

UNIT-III

Transport Layer: Elements of transport Protocol, Congestion Control, Performance issues, Transmission Control Protocol (TCP), Remote Procedure Call (RPC)- Implementation semantics of RPC, Client server applications. Real-time Transport Protocol (RTP), Multimedia applications, Congestion control and resource allocation, congestion control in TCP and UDP.

UNIT-IV

Application Layer: Domain Name Server, World Wide Web- HTTP, Presentation formatting and Data Compression, Network Security- Cryptographic tools, the problems of key distribution, General Authentication techniques, PGP, SSH, IPSEC and Firewalls

UNIT-V

Network Application and Protocols: File Transfer Protocol, email and the Web, Multimedia applications such as IP telephony, Video streaming, Overlay Networks like peer-to-peer file

sharing and Content Distribution Networks (CDN), Web Services architectures for developing new application protocols

Text Books:

1. Larry L Peterson, Bruce S Davis, "Computer Networks", 5th Edition, Elsevier, 2012.
2. Andrew S. Tannenbaum, David Wetherall "Computer Networks", 5th Edition, Pearson Edu, 2010.

Suggested Reading:

1. Forouzon, "Computer Networks and communication – Top down Approach", 5thEdition, 2013.

CS 351

INFORMATION STORAGE AND MANAGEMENT

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives:

1. Evaluate storage architectures; understand logical and physical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems.
2. Describe networking technologies such as FC-SAN,NAS, IP-SAN and data archival solution - CAS.
3. Identify different storage virtualization technologies, backup technologies and their benefits.
4. Understand and articulate business continuity solutions including, backup technologies, and local and remote replication solutions, information security, and storage security domains.

Course Outcomes:

1. Describe and apply storage technologies.
2. Identify leading storage technologies that provide cost-effective IT solutions for medium to large scale businesses and data centers.
3. Describe important storage technologies, features such as availability, replication, scalability and performance.
4. Manage virtual servers and storage between remote locations, design, analyze and manage clusters of resources, desing, analyze and manage clusters of resources.

UNIT-I

Storage System: Introduction to information storage, virtualization and cloud computing, Key data center elements, Compute, application, and storage virtualization, Disk drive & flash drive compnents and performance, RAID, Intelligent storage system and storage provisioning (including virtual provisioning).

UNIT-II

Storage Networking: Fibre Channel SAN components, FC protocol and operation, Block level storage virtualization, iSCSI and FCIP as an IP-SAN solutions, Converged networking option – FcoE, Network Attached Storage (NAS) – components, protocol and operation, File level storage virtualization, Object based storage and unified storage platform.

UNIT-III

Backup, Replication, Archive: Business continuity terminologies, planning and solutions, Clustering and multi-pathing architecture to avoid single points of failure, Backup and recovery – methods, targets and topologies, Data de-duplication and backup in virtualized environment, Fixed content and data archive, Local replication in classic and virtual environments, Remote

replication in classic and virtual environments, Three-site remote replication and continuous data protection.

UNIT-IV

Cloud Infrastructure: Cloud Enabling Technologies, Characteristics of Cloud Computing, Benefits, Cloud Service Models, Deployment Models, Cloud Computing Infrastructure, Cloud Challenges, Cloud Adoption Consideration, Concepts in practice.

UNIT-V

Storage Security & Management: Security threats, and countermeasures in various domains, Security solutions for FC-SAN, IP-SAN and NAS environments, Security in virtualized and cloud environments, Monitoring and managing various information infrastructure components in classic and virtual environments, information lifecycle management(ILM) and storage tiering.

Case Study:

1. Technologies described in the course are reinforced with BROCADE & EMC examples of actual solutions.
2. Realistic case studies enable the participants to design the most appropriate solution for given sets of criteria.

Text Books:

1. EMC Corporation, "Information Storage and Management", Second Edition, Wiley Publishers.
2. John W. Rittinghouse, "Implementation Management and Security", James F. Ransome, CRC Press.

Suggested Reading:

1. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.
2. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne, 2001.
3. Meeta Gupta, "Storage Area Network Fundamentals", Rearson Education Limited, 2002.

CS 352

IMAGE PROCESSING
(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To gain the fundamentals of digital image processing.
2. To provide mathematical foundations for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression.
3. To be able to formulate solutions to general image processing problems,

Course Outcomes:

1. Student will learn the mathematics behind the image processing
2. Student will be able to understands the significance of image processing and will be able to solve the problems in image processing

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, Image Smoothing and Sharpening using Frequency Domain Filters.

UNIT-III

Filtering Intensity Transformations and Spatial: Histogram Processing, Fundamental of Spatial Filtering, Smoothing and Sharpening Spatial Filters.

Image Segmentation: Point, Line and Edge Detection, Thresholding-(Foundation, Basic global thresholding, Otsus method), 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.

Color Image Processing: Color fundamentals, Color models, Pseudocolor Image Processing, Basics of full color image processing.

Text Books:

1. Gonzalez R.C., Woods R.E**:** Digital Image Processing, Pearson Education, third edition 2012.
2. William K. Pratt," Digital Image Processing",John Wiley & Sons Inc.Edition,2001.

Suggested Reading:

1. McAndrew, Introduction to Digital Image Processing, Cengage Learning 2004.
2. Sonka, Hlavac, Boyle, Digital Image Processingand Computer vision, Cengage learning, 2008.
3. Rosenfeld A. Kak AC: Digital Picture Processing Vol.I & II Acad,Press,2nd Edition , 1982.

CS 353

ADVANCED COMPUTER ARCHITECTURE

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives:

1. To describe computational models and learn the fundamental aspects of computer architecture design
2. Understand advanced issues in design of computer processors, caches, and memory.
3. Analyze performance trade-offs in computer design.
4. Understand pipelining, instruction set architectures and Multi-Threaded Architectures
5. To acquaint the student with various classes of computers, and new trends and developments in computer architecture

Course Outcomes:

1. Understand the advanced concepts of computer architecture
2. Apply knowledge of processor design to improve performance in algorithms and software systems.
3. Investigate modern design structures of Pipelined Processors and Multiprocessor Systems
4. Become acquainted with recent computer architectures and I/O devices
5. Gain knowledge of Semiconductor technology, Interconnection technology, Optical computing, Bio-electronic computing and future directions.

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 and description of computer architectures.

Introduction to Parallel Processing: Basic concepts, Types and levels of 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 branching, Branch processing, Multiway branching, 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 multi-computers.

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.

Text Books:

1. Sima, Fountain, Kacsuk, "Advanced Computer Architectures: A design space approach", Pearson Education,2004.
2. Richard Y.Kain, "Advanced Computer Architectures: 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.

Suggested Reading:

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

CS 354

SIMULATION AND MODELING

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Introduce computer simulation technologies and techniques, provides the foundations for the student to understand computer simulation needs, and to implement and test a variety of simulation and data analysis libraries and programs. This course focuses what is needed to build simulation software environments, and not just building simulations using preexisting packages.
2. The goal is to introduce students to basic simulation methods and tools for modeling and simulation of continuous, discrete and combined systems.
3. Introduce concepts of modeling layers of society's critical infrastructure networks.
4. Build tools to view and control simulations and their results.

Course Outcomes:

Students will be exposed to the details of modeling and simulation technologies. They will cover the following:

1. Basic Model Forms,Simulation Approaches
2. Handling Stepped and Event-based Time in Simulations
3. Discrete versus Continuous Modeling
4. Numerical Techniques
5. Sources and Propagation of Error
6. By the end of the course students will be able to apply the fundamental laws of performance analysis to establish the relationships between workload parameters and system performance for a given system.

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-FOTTRAN, 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 and 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 Turning 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, Comparision and evaluation of alternative system designs: Comparison of several system designs. Statistical models for estimating the effect of design alternatives.

Text Books:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, and David M. Nicol. Discrete-Event System Simulation, Pearson Education Asia, 2001.
2. Narsingh Deo, System Simulation with Digital Computers, Prentice Hall of India, 1979.

Suggesting Reading:

1. Anerill M Law and W. David Kelton, Simulation Modeling and Analysis, McGraw Hill, 2009.

CS 355

REAL TIME SYSTEMS

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Define Real Time systems and differentiate between hard and soft realtime systems
2. Study applications of realtime systems
3. Get a theoretical understanding of realtime aspects of computing in terms of scheduling, timing and concurrency
4. Know specific design and implementation aspects of realtime systems
5. Understand capabilities of RealTime operating systems like Vx Works and RT Linux

Course Outcomes:

1. Understand the fundamental concepts of real-time systems.
2. Gain theoretical and practical knowledge of real-time operating systems
3. Understand capabilities of commercial off-the-shelf R-T kernel

UNIT-I

Introduction: Definition, Applications and Types of Real Time Systems, Typical Case Studies of Real Time Systems, Timing Constraints.

A Reference Model for Real Time Systems: Processors and Resources, Periodic Task Model, Precedence and Data Dependency, Temporal, Functional and Resource parameters, Scheduling Hierarchy.

UNIT-II

Real Time Scheduling: Different Approaches – Clock Driven, Priority Driven, Scheduling of Periodic, Aperiodic and Sporadic Jobs in Priority Driven Systems.

UNIT-III

Resource Management: Resources and Resource Access Control, Critical Section, Priority: Ceiling Protocols, Concurrent Access to Data Objects.

UNIT-IV

Implementation Aspects: Timing Services and Scheduling Mechanisms, Other Basic Operating System Functions, Processor Reserves and Resource Kernel, Open System Architecture, Capabilities of Commercial Real Time Operating Systems, Predictability of General Purpose Operating Systems.

UNIT-V

Case Studies: Vx – Works, RT Linux.

Text Books:

1. Jane W.S. Liu, “Real Time System”, Pearson Education Asia, 2001.

Suggested Reading:

1. C.M. Krishna and Kang O. Shin, “Real Time Systems”, McGraw Hill Companies Inc., 1997.
2. Raymond J.A. Buhr, Donald L. Bailey, “An Introduction to Real Time Systems”, Prentice Hall International, 1999.
3. K.V.K.K. Prasad, “Embedded Real Time Systems, Concepts, Design and Programming”, Dream Tech., 2003.

CS 356

SOFT COMPUTING

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To learn various types of soft computing techniques and their applications.
2. To acquire the knowledge of neural network architectures, learning methods and algorithms.
3. To understand Fuzzy logic ,Genetic algorithms and their applications.

Course Outcomes:

1. Ability to apply soft computing techniques to solve different applications.
2. Design and develop various Neural Network Architectures.
3. Ability to use fuzzy logic, genetic algorithms in different applications.

UNIT-I

Soft computing vs. Hard computing, Various types of soft computing techniques.
Artificial Neural Networks: Fundamental concepts, Evolution of neural networks, Basic models of artificial neural network, Important terminologies of ANNs. McCulloch-Pitts neuron, Linear separability, Hebb network.

UNIT-II

Supervised Learning Neural Networks: Perceptron networks, Adaptive linear neuron(Adaline), Multiple Adaptive linear neuron(Madaline), Back propagation network

UNIT-III

Unsupervised Learning Neural Networks: Kohonen self organizing networks, Adaptive resonance theory.
Associate Memory Networks: Bidirectional associative memory network, Hopfield networks.

UNIT-IV

Fuzzy Logic: Introduction to classical sets and Fuzzy sets, Fuzzy relations, Tolerance and equivalence relations, Membership functions, Defuzzification,

UNIT-V

Genetic Algorithms: Introduction, Basic operators and terminology, Traditional algorithm vs. genetic algorithm, Simple genetic algorithm, General genetic algorithm, Classification of genetic algorithm, Genetic programming, Applications of genetic algorithm.

Text Books:

1. S.N. Sivanandam& S.N. Deepa, ”Principles of soft computing”, Wiley publications, 2nd Edition, 2008.

Suggested Readings:

1. S. Rajasekaran& G.A. Vijayalakshmipai, "Neural Networks, Fuzzy logic & Genetic Algorithms, Synthesis & Applications", PHI publication, 2008.
2. LiMin Fu, “Neural Networks in Computer Intelligence”,McGraw-Hill edition, 1994.
3. K.L.Du& M.N.S Swamy, "Neural Networks in a Soft Computing Framework", Springer International edition, 2008.
4. Simon Haykins, "Neural Networks a Comprehensive Foundation", PHI, second edition.
5. Goldberg, David E., "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, New Delhi, 2002.

CS 326

WEB TECHNOLOGIES LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. To acquire knowledge of XHTML, Java Script and XML to develop web applications
2. Ability to develop dynamic web content using Java Servlets and JSP
3. To understand JDBC connections and Java Mail API
4. To understand the design and development process of a complete web application

Course Outcomes:

1. Students will be able to develop static web sites using XHTML and Java Scripts
2. To implement XML and XSLT for web applications
3. Develop Dynamic web content using Java Servlets and JSP
4. To develop JDBC connections and implement a complete Dynamic web application

List of experiments:

1. Creation of static web site using XHTML and CSS.
2. Demonstration of XML, XSLT.
3. Validation of static web page using Java script.
4. Creation of dynamic content in web application using servlets.
5. Handling Sessions in web applications.
6. Usage of Filters in web applications.
7. Creation of dynamic content in web application using JSP
8. Providing data store support for web site using JDBC
9. Implementation of JAVA MAIL
10. CASE STUDY:

    Creation of dynamic web site using all the above topics.

Text Books :

1. SubramanyamAllamraju, “Professional Java Server programming”, J2EE 1.3 Edition, CeditBuest, Apress Publications.
2. Robert W Sebesta, “Programming the World Wide Web”, Pearson Education

CS 327

COMPILER CONSTRUCTION LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objective:

1. To implement Lexical Analyzer using Lex tool & Syntax Analyzer or parser using YACC Tool
2. To implement NFA and DFA from a given regular expression
3. To implement front end of the compiler by means of generating Intermediate codes.
4. To implement code optimization techniques.

Course Outcomes:

1. Design & implement a front end of the compiler.
2. Develop program for solving parser problems.
3. Create program for intermediate code generation and optimization of the IC.
4. Learn & use the new tools and technologies used for designing a compiler.

List of experiments:

1 Program to implement Standalone Scanner
2 Implement Scanner using LEX tool.
3 Implementing TOPDOWN PARSERS RDP
4 Implement First Method
5 Implement Follow Method
6 Program to implement LL(1) parsing technique.
7 BOTTOM UP PARSERS:Program to implement Parser using Yacc.
8 Implementing basic calculator using YACC
9 Implement Closure
10 Implement Goto
11 Intermediate code generation
12 Program to perform Code Optimization.

Text Books:

1. Keith D Cooper & Linda Tarezon, "Engineering a Compiler", MorganKafman, Second edition.Lex&Yacc, John R Levine, Tony Mason, Doug Brown, ShroffPublishers.

Suggested Reading:

2. Kenneth C Louden, "Compiler Construction: Principles andPractice", Cengage Learning. Lex&Yacc, John R Levine, Oreilly Publishers.

CS 328

COMPUTER NETWORKS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. To understand various network concepts
2. Protocols and develop network related applications using those protocols. Also simulate various network protocols like ARP, Sliding Window Flow control, FTP etc. and evaluate some protocols.
3. To understanding the public key concepts

Course Outcomes:

After completion of this course, student will be able to

1. Understand about the network programming concepts
2. Develop network-oriented applications and simulate network protocols
3. Evaluate network performance
4. Implement security algorithms

Computer Networks Lab:

1. Programs using TCP sockets
2. Programs using UDP
3. Programs using Raw Sockets like packet capturing and filtering)
4. Programs using RPC
5. Simulation of Sliding Window Protocol
6. Implementation of ARP
7. Implementation and performance evaluation of routing Protocols
8. Study of UDP performance
9. Study of TCP performance
10. Implementation of RSA
11. Simulation of FTP
12. Simulation of ping

Suggested Readings:

1. UNIX Network Programming, Volume 1, W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Addison Wesley Professional, 2004
2. W. Richard Stevens, Stephen A. Rago "Advanced Programming in the UNIX Environment", Addition Wesley, 2013

CS 329

INDUSTRIAL VISIT/SUMMER INTERNSHIP

14 Periods / Semester

Students are expected to visit at least two industries during the semester and submit a detailed technical report about the industrial visit/study. The department should evaluate the reports through a committee.