

## DIGITAL ELECTRONICS AND COMPUTER DESIGN

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 1.1 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I:

**Digital computers and digital systems:** binary numbers, Binary addition and Subtraction, Unsigned Binary numbers, 1's compliments, 2's compliments, Number base conversion, Octal and Hexadecimal number system, Compliments, Binary codes, Binary storage and Registers. **6 hrs.**

### UNIT - II:

Definition of Boolean Algebra, Laws and Theorems and properties of Boolean algebra, Simplifications of Boolean functions for 2, 3 and 4 variable maps, Sum-of-products, product of sums, Karnaugh Map, menthol Canonical forms, Don't Care conditions. **7 hrs.**

### UNIT - III:

**Combinational logic Circuits:** Design procedure, Adders, Subtractions, code conversion, Overview of Basic gates, Universal Logic Gates, Positive and Negative Logic, Universal Logic gates. **7 hrs.**

### UNIT - IV:

**Registers:** Types of registers, Serial In-Serial Out, Serial in Parallel Out, Parallel In-Serial Out, Parallel In Parallel Out, Application of Shift Register. **7 hrs.**

### UNIT - V:

**Counters:** Asynchronous Counters, Decoding Gates, Ripple counters, Synchronous Counters, Decade Counters, Timing sequence, A Digital Clock. **7 hrs.**

### UNIT - VI:

**Logical Organization and Architecture:** Layered view of Computer,, Machine assembly language, High level language, Operating system level, Instructions and Data Representation, CPU organization. **6 hrs.**

### UNIT - VII:

**Central Processing Unit:** Introduction, Operation code, Encoding, Decoding, Addressing modes, Registers, Clock Timing. **6 hrs.**

### UNIT - VIII:

**Memory system:** Basic concepts, Semiconductor RAM memories, Read only Memory, Speed, Size and Cost, Cache Memories. **6 hrs.**

### TEXT BOOK:

1. *Morris Mano M.*, "Digital logic and Computer Design", PHI.

### REFERENCE BOOKS:

1. *V. Rajaraman, T. Radhakrishnan*, "An Introduction to Digital Computer Design", PHI
2. *Stephen Brown, Zvonko Vranesic*, "Fundamentals of Digital Logic with Verilog Design", TMH, 2006
3. *Charles H. Roth, Jr. 5th Edition, Thomson*, "Fundamentals of Logic Design", 2004
4. *Donals Leach, Albert Paul Malvino & Goutam Saha*, "Digital Principles and Applications", 6th Edition, TMH, 2006.
5. *Carl Hamcher, Zvonoko Vranesic, Safwat Zaky*, "Computer Organization", 5th Edition, TMH, 2002.

## DISCRETE MATHEMATICAL STRUCTURES

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 1.2 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I:

**Set theory:** Sets and Subsets, Operations on sets, Product of sets, Principles of Inclusion and Exclusion, Countable and Uncountable sets, Counting and Venn Diagrams. **6 hrs.**

### UNIT - II:

**Mathematical Logic:** Statements and Notations, Connectives and Truth tables, logic equivalence, well formed formulas, Tautologies, Implications, Use of Quantifiers, Qualifiers. **6 hrs.**

### UNIT - III:

**Fundamental Principles of Counting:** Integer properties, Counting Technique, The rules of sum of product, Permutations, Combinations, Fundamental Mathematical Induction, Well ordering principle, Recursive function. **7 hrs.**

### UNIT - IV:

**Relations and Functions:** Cartesian Products, Relations, Types of relations, Matrix Relation, Equivalence relations and partitions, Matrices and Directed graphs, Operations on relations. **6 hrs.**

### UNIT - V:

**Functions:** Types of Functions, One-to-one, Onto functions, Invertible functions, Permutation functions, Pigeonhole principle, Function composition and Inverse Functions.

**Boolean Algebra:** Boolean algebra, Uniqueness of finite Boolean algebra, Boolean functions and expressions. **7 hrs.**

### UNIT - VI:

**Groups:** Definitions and Examples, Homomorphism, Isomorphism, Cyclic Groups, Cosets and Lagrange's Theorem. Semigroups, Monoid, Generators and Evaluation of powers. **7 hrs.**

### UNIT - VII:

**Graphs:** Basic Terminology, Multigraphs and weighted graphs, Paths and Circuits, Hamiltonian paths and Circuits. **7 hrs.**

### UNIT - VIII:

**Trees:** Rooted Trees, Prefix codes, Binary search Trees, Spanning Trees. **6 hrs.**

### TEXT BOOK:

1. *Ralph Grimaldi, B. V. Ramana*, "Discrete and Combinational Mathematics", 5th edition, Pearson Education.

### REFERENCE BOOKS:

1. *Kenneth H. Rosen*, "Discrete Mathematics and Its Applications", 6th Edition, 2007, McGraw Hill.
2. *D. S. Malik and M. K. Sen, Thomson*, "Discrete Mathematical Structures: Theory and Applications", 2004.
3. *Kolman B. and Busby and Ros*, "Discrete Mathematical Structures", 4/e, Pearson Education.
4. *Purna Chandra Biswal*, "Discrete Mathematics and Graph Theory", PHI.

## DATA STRUCTURES WITH C

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 1.3 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I :

**Pointers:** Concept, pointer variables, Accessing variables through pointers, pointer declaration and definition of pointer variables, Pointer and function, pointer to pointers, Compatibility, L value and R value, Array and pointer, pointer arithmetic and arrays, passing an array to a function, Understanding complex declaration, Memory allocation function, Array of pointers. **8 hrs.**

### UNIT - II :

**Introduction:** Concept of Data structures, overview of data structures, Implementation of data structures. **4 hrs.**

### UNIT - III:

**Stacks:** stack representation, operation on stack, application of stack, conversion of expression precedence, & associative of operators conversion from infix to postfix, conversion of infix to prefix, Evaluation of postfix expression. **8 hrs.**

### UNIT - IV:

**Recursion:** Recursive definition, How recursion works, Fibonacci series, Euclid's algorithm, Tower of Hanoi problems. **7 hrs.**

### UNIT - V:

**Queue:** Definition of queue, operations on queue, application of queue, different types of queue, Double ended queue, Circular queue, priority queue. **7 hrs.**

### UNIT - VI:

**Lists:** Definition of Linked list, Singly linked list, operation on singly linked list, Circular singly linked list, Doubly linked list, Application of linked list. **6 hrs.**

### UNIT - VII:

**Trees:** Binary tree, representation of binary tree, operation on binary tree, application of binary tree. **8 hrs.**

### UNIT - VIII:

**Sorting and Searching:** Definitions, Bubble sort, selection sort, Merge sort, Quick sort, Tree sort, Radix sort, Linear search, Binary search. **7 hrs.**

### TEXT BOOKS:

1. Behrouz A. Forouzan and Richard F. Gilberg, Thomson, "Computer science A structured programming Approach Using C", Second Edition, 2003.
2. Aaron M. Tenenbaum, Yedidyah Langsam & Moshe J. Augenstein, "Data Structure using C", Pearson Education / PHI, 2006.

### REFERENCES :

1. A.M. Padma Reddy, "Systematic Approach to Data Structures Using C", Sri. Nandaz Publications.
2. Robert Kruse and Bruce, "Data structures & program design in C", Lenug, Pearson Education.
3. Richard F. Gilberg and Behrouz A. Forouzan, "Data structures A Pseudocode approach with C", Thomson, 2005.

## OBJECT ORIENTED PROGRAMMING WITH C++

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|----------------------------|----------|------------|----|
| Subject Code               | C.S. 1.4 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I:

**Principles Of Object Oriented Programming:** Object Oriented Programming, Object Oriented Programming Paradigm, Basic Concepts Of Object Oriented Programming, Benefits Of Object Oriented Programming, Applications Of Object Oriented Programming. **6 hrs.**

### UNIT - II:

**Introduction to C++:** What is C++? Applications of C++, Structure of C++ program, Creating A Source File, Compiling and Linking, Tokens, Keywords, Identifiers and Constants, Data Types, Operators, Operator overloading.

**Class and Objects:** Introduction to Classes and Objects. Member Functions and Member data, Nesting of Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function, Arguments, Friendly Functions, Returning Objects, constant Member Functions, Pointers to Members, Local Classes. **7 hrs.**

### UNIT - III:

**Functions In C++:** Introduction, The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Arguments, const Arguments, Function Overloading, Friend and Virtual Functions, Math Library Functions. **6 hrs.**

### UNIT - IV:

**Constructors and Destructors:** Introduction to Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Destructors. **6 hrs.**

### UNIT - V:

**Operator Overloading and Type Conversions:** Introduction, Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Binary Operators Using Friends, Manipulation of Strings Using Operators, Rules for Overloading Operators, Type Conversions. **7 hrs.**

### UNIT - VI:

**Inheritance: Extending Classes:** Introduction, Defining Derived Class, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes: Nesting of Classes. **7 hrs.**

### UNIT - VII:

**Pointers, Virtual Functions and Polymorphism:** Introduction, Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions. **6 hrs.**

### UNIT - VIII:

**Templates:** Introduction, class templates, class templates with multiple parameters, function templates, function templates with multiple parameters, overloading of template function, member function templates, type template arguments. **7 hrs.**

### TEXT BOOK:

1. *Balaguruswamy*, "Object Oriented Programming With C++", TATA McGRAW HILL.

### REFERENCE BOOK:

1. *Sourav Sahay*, "Object Oriented Programming With C++", Oxford University Press.
2. *Stanliy B. Lippman, Josee Lajoie*, "C++ Primer", Barbara E. Moo, Addison Wesley
3. *Herbert Schildt*, "The Complete Reference C++", TMH.

## **DATA STRUCTURES LAB**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 1.6 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

Assignments related to the subject “Data structures” to be implemented Using C.

## **OOPS WITH C++**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 1.7 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

Familiarity with the C++ programming language to be gained through practical assignments.  
Assignments related to the subject studied during the semester to be implemented Using C++

## ANALYSIS AND DESIGN OF ALGORITHMS

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 2.1 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I:

**Design of Efficient Algorithms:** Algorithms, Analysis Of Algorithms, Time And Space Complexity, Running Time Of A Program. **6 hrs.**

### UNIT - II:

**Elementary Data Structures:** Review Of Stack, Queues, Trees. Operations On Stack, Queue And Trees. Recursion, Heaps And Heap Sort. **6 hrs.**

### UNIT - III:

**Divide and Conquer:** General Method , Binary Search, Max And Min, Merge Sort, Quick Sort, Matrix Multiplication And Related Operations; Strassen's Matrix Multiplication, Inversion Matrices, LUP Decomposition And Its Application, Boolean Matrix Multiplication. **7 hrs.**

### UNIT - IV:

**The Greedy Method:** The General Method, Knapsack Problem, Job Sequencing With Deadlines, Minimum Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm. Optimal Storage On Tapes, Optimal Merge Patterns, Single Source Shortest Paths. **7 hrs.**

### UNIT - V:

**Dynamic Programming:** The General Method, Multistage Graphs, All Pair's Shortest Paths. **6 hrs.**

### UNIT - VI:

**Fast Fourier Transform:** Discrete Fourier Transform And Its Inverse, FFT Algorithm, FFT Using Bit Operations, Product Of Polynomials, Schonhage - Straessen Integer Multiplication Algorithm. **7 hrs.**

### UNIT - VII:

**Integer and Polynomial Arithmetic:** Integer And Polynomial Multiplication And Division, Modular Arithmetic, Chinese Remaindering, GCD And Euclid's Algorithm. **7 hrs.**

### UNIT - VIII:

**Backtracking:** General Methods, 8 – Queens Problem, Sum Of Subsets, Knapsack Problem, NP – Hard And NP – Complete Problems. **6 hrs.**

### TEXT BOOK:

1. *Ellis, Horwitz, Sartaj Sahani and Rajashekar S.*, "Computer Algorithms", (1999) Galgotia Publications Pvt.,Ltd.

### REFERENCES:

1. *Aho A.V, Hopcroft J.E and Ullman, J.D.*, "The Design and Analysis of Computer Algorithms", (1976) Addison – Wesley .
2. *Sara Baase, Computer Algorithms*, "An Introduction to Design and Analysis", Addison Wesley.

## DATABASE MANAGEMENT SYSTEMS

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 2.2 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I:

**Introduction:** Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems. **8 hrs.**

### UNIT –II:

**Entity-Relationship Model:** Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two. **6 hrs.**

### UNIT - III:

**Relational Model and Relational Algebra:** Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping. **8 hrs.**

### UNIT - IV:

**SQL - 1:** SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. **6 hrs.**

### UNIT - V:

**SQL - 2:** Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures and SQL / PSM. **6 hrs.**

### UNIT - VI:

**Database Design - 1:** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form. **6 hrs.**

### UNIT - VII:

**Database Design - 2:** Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms. **6 hrs.**

### UNIT – VIII:

**Transaction Management:** The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; Introduction to ARIES; The log; Other recovery-related structures; The write -ahead log protocol; Check pointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control. **8 hrs.**

### TEXT BOOKS:

1. *Elmasri and Navathe*, “Fundamentals of Database Systems” 5th Edition, 2007, Addison-Wesley.
2. *Raghu Ramakrishnan and Johannes Gehrke* “Database Management Systems”, 3rd Edition, 2003, McGraw-Hill.

## REFERENCE BOOKS:

1. *Silberschatz, Korth and Sudharshan*, “Data Base System Concepts”, 5th Edition, 2006, McGrawHill.
2. *C. J. Date, A. Kannan, S. Swamynatham*, “An Introduction to Database Systems” 8th Edition, 2006, Pearson Education.

## OPERATING SYSTEM

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 2.3 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I:

**Introduction to Operating Systems, System Structures:** What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system; Special-purpose systems; Computing environments. 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 generation; System boot. **6 hrs.**

### UNIT - II:

**Process Management:** Process concept; Process scheduling; Operations on processes; Inter-process communication. Multi-Threaded Programming: Overview; Multithreading models; Thread Libraries; threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling; Thread scheduling. **7 hrs.**

### UNIT - III:

**Process Management Synchronization:** The Critical section problem; Peterson’s solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors. **7 hrs.**

### UNIT - IV:

**Deadlocks:** System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. **6 hrs.**

### UNIT - V:

**Memory Management Strategies:** Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. **7 hrs.**

### UNIT - VI:

**File System Implementation of File System:** File concept; Access methods; Directory structure; File system mounting; File sharing; Protection. Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management. **7 hrs.**

### UNIT - VII:

**Secondary Storage, Structures, Protection:** Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. 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. **6 hrs.**

**UNIT - VIII:**

**Case Study: The LINUX and Operating System: 6 hrs.**

**TEXT BOOK:**

1. *Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles" 7<sup>th</sup> edition, 2006, Wiley-India.*

**REFERENCE BOOKS:**

1. *Milan Milankovic, "Operating System concepts and design", II Edition, Migrawhill*
2. *D.M Dhamdhere, "Operating Systems A Concept Based Approach", 2<sup>nd</sup> Edition, 2002, Tata McGraw- Hill.*
3. *"Operating Systems", 3<sup>rd</sup> Edition, 1990, Addison Wesley.*
4. *P.C.P. Bhatt, "Operating Systems", 2<sup>nd</sup> Edition 2006, PHI.*

## COMPUTER NETWORKS

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 2.4 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I:

**Introduction of Computer Networks:** What is Computer Network, Network Goal/Motivations, Applications of Networks, Network Structure, Topology, Classification of Networks, OSI Reference Model. **6 hrs.**

### UNIT - II:

**Data Signals and Digital Transmission:** Analog & Digital signals, Transmission impairment, Data rate limits, Performance, Digital-To-Digital Conversion, Transmission modes. **7 hrs.**

### UNIT - III:

**Multiplexing:** Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing, Spread Spectrum-Frequency Hopping Spread Spectrum, Direct Sequence Spread Spectrum. **6 hrs.**

### UNIT - IV:

**Transmission Media, Error Detection and Correction:** Twisted Pair cable, Co-axial Cable, Fiber-Optic cable, Radio Waves, Microwaves, Infrared Error Detection Techniques-parity Checks, Cyclic Redundancy Checks, Forward Error Correction. **7 hrs.**

### UNIT - V:

**Data Link Control:** Framing, Flow & Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-To-Point Protocol- Faring Transition Phases . **6 hrs.**

### UNIT - VI:

**Multiple Access:** Random Access, ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple, Access With Collision detection (CSMA/CD), Carrier Sense Multiple Access With Collision Avoidance (CSMA/CA). **7 hrs.**

### UNIT - VII:

**Wireless Lan and Construction of Lan:** IEEE 802.11, Bluetooth, Architecture, Bluetooth Layers, Radio layers. Connecting Devices: Passive Hubs, Repeaters Active Hubs, Bridges **6 hrs.**

### UNIT - VIII:

**Transport and Application Layers:** User Datagram Protocol(UDP),TCP,TCP services, TCP Features, TELNET, ELECTRONIC MAIL, Architecture. **7 hrs.**

### TEXT BOOKS:

1. *Behrouz A Forouzan* "Data Communication and Networking", McGraw-Hill Companies, 4<sup>th</sup> Edition.

### REFERENCE BOOKS:

1. *Tanenbaum, A.T.*, "Computer Networks" PHI, Edition.
2. *Alberto Leon, Garcia & Indira Widjaja* "Communication Network, Fundamental Concept's & Key architecture", 3<sup>rd</sup> Edition Tata McGraw Hill.
3. *William Stallings*, "Data and Computer Communication", 8<sup>th</sup> Edition, Pearson Education.
4. *Nader F.* "Computer and Communication Networks" Mir, Pearson Education, 2007.
5. *Wayne Tomasi*, "Introduction of Data Communication and Networking", Pearson Education .

## **DBMS LAB**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 2.6 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

Studying features of commercial DBMS package (MS-Access/Oracle/Foxpro/Dbase or any latest DBMS package) and structure Query language. Define scheme for application creations of database, modification and updation of database, writing SQL Queries to retrieve information from the database. Forms and reports generation. Writing simple applications like accounting for a shop, personal accountants insurance, loans, mortgagee payments, hotel account, admission etc.

## **NETWORK PROGRAMMING LAB**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 2.7 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

Network concepts and techniques to be gained in LINUX/UNIX network environment. Assignments related to the topic Analysis and design of Algorithms to be implemented using C/C++.

## SOFTWARE ENGINEERING

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 3.1 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I:

**Overview:** Introduction: FAQ's about software engineering, Professional and ethical responsibility. Socio-Technical systems: Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems. **6 hrs.**

### UNIT - II:

**Critical Systems, Software Processes:** Critical Systems: A simple safety-critical system; System dependability; Availability and reliability. Software Processes: Models, Process iteration, Process activities; The Rational Unified Process; Computer-Aided Software Engineering. **7 hrs.**

### UNIT - III:

**Requirements:** Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; Interface specification; The software requirements document. Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management. **6 hrs.**

### UNIT - IV:

**System Models, Project Management:** System Models: Context models; Behavioral models; Data models; Object models; Structured methods. Project Management: Management activities; Project planning; Project scheduling; Risk management. **7 hrs.**

### UNIT - V:

**Software Design:** Architectural Design: Architectural design decisions; System organization; Modular decomposition styles; Control styles. Object-Oriented design: Objects and Object Classes; An Object-Oriented design process; Design evolution. **7 hrs.**

### UNIT - VI:

**Development:** Rapid Software Development: Agile methods; Extreme programming; Rapid application development. Software Evolution: Program evolution dynamics; Software maintenance; Evolution processes; Legacy system evolution. **6 hrs.**

### UNIT - VII:

**Verification and Validation:** Planning; Software inspections; Automated static analysis; Verification and formal methods. Software testing: System testing; Component testing; Test case design; Test automation. **7 hrs.**

### UNIT - VIII:

**Management:** Managing People: Selecting staff; Motivating people; Managing people; The People Capability Maturity Model. Software Cost Estimation: Productivity; Estimation techniques; Algorithmic cost modelling, Project duration and staffing. **6 hrs.**

### **TEXT BOOKS:**

1. *Ian Sommerville*, "Software Engineering" 8<sup>th</sup> Edition, Pearson Education, 2007.

### **REFERENCE BOOKS:**

1. *Waman S Jawadekar*, "Software Engineering Principles and Practice" 2004, Tata McGraw Hill.

2. *Roger S. Pressman*, “A Practitioners Approach” 7<sup>th</sup> Edition, 2007, McGraw-Hill,
3. *P. Jalote*, “An Integrated Approach to software Engineering” Narosa
4. *Mall R*, “Fundamentals of Software Engineering”, Prentice Hall of India.

### **COMPUTER GRAPHICS AND VISUALIZATION**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 3.2 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

#### **UNIT - I:**

**A Survey Of Computer Graphics:** Computer Aided Design, Presentation Graphics, Computer Arts, Entertainment, Education And Training, Visualization, Image Processing, Graphical User Interface.

**6 hrs.**

#### **UNIT - II:**

**Overview Of Graphics Systems:** Video Display Devices, Raster Scan Systems, Random Scan Systems, Input Devices, Hard Copy Devices, Graphics Software.

**6 hrs.**

#### **UNIT - III:**

**Output Primitives:** Points And Lines, Line Drawing Algorithms, Loading And Frame Buffer, Line Function, Circle Generating Algorithms, Pixel Addressing, Filled Area Primitives, Filled Area Functions, Cell Array, Character Generation.

**7 hrs.**

#### **UNIT - IV:**

**Attributes Of Output Primitives:** Line Primitives, Curve Primitives, Colors And Gray Scale Levels, Area Fill Attributes, Character Attributes.

**6 hrs.**

#### **UNIT - V:**

**Two Dimensional Geometric Transformations:** Basic Transformations, Matrix Representation And Homogeneous Coordinates, Composite Transformations, Other Transformations, Transformations Between Coordinate Systems, Raster Methods For Transformations.

**7 hrs.**

#### **UNIT - VI:**

**Two Dimensional Viewing:** The Viewing Pipeline, Viewing Co-Ordinate Reference Frame, Window To View Port Co-Ordinate Transformations, Clipping Operations, Point Clipping, Cohen-Sutherland Line Clipping, Sutherland-Hodgeman Polygon Clipping, Curve And Text Clipping.

**7 hrs.**

#### **UNIT - VII:**

**Three dimensional concepts:** parallel projection, perspective projection, depth cueing, visible line and surface identification, surface rendering, exploded and cutaway views, three dimensional and stereoscopic views.

**7 hrs.**

#### **UNIT - VIII:**

**Three dimensional geometric transformations:** translation, rotation, scaling and other transformations.

**6 hrs.**

#### **TEXT BOOK:**

1. *Donald Hearn and Pauline Baker*, “Computer Graphics- C Version”, 2<sup>nd</sup> Edition, 2003, Pearson Education.

**REFERENCE BOOK:**

1. *James D. Foley, Andries Van Dam, Steven K. Feirger and John I Hughes*, “Computer Graphics Principles and Practice”, Addison Wesley, 1997.
2. *F.S. Hill, Jr.*, “Computer Graphics Using Open GL”, 2<sup>nd</sup> Edition, 2001, Pearson education.

**UNIX AND SHELL PROGRAMMING**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 3.3 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

**UNIT - I:**

Features of Unix, Unix System and Organization, Unix commands, Unix file system, Create files, directories and Basic commands. **6 hrs.**

**UNIT - II:**

File Attributes, File permissions and File related commands, Vi-editor. **7 hrs.**

**UNIT - III:**

Standard Input/Output commands, Piping, Simple Filters, Mathematical commands. **6 hrs.**

**UNIT - IV:**

The shell, Types of shells, Features of shell, The process, Shell Variables, **6 hrs.**

**UNIT - V:**

Loop control structures, Decision commands, Logical operators. **6 hrs.**

**UNIT - VI:**

Shell script, Essential Shell programming, **7 hrs.**

**UNIT - VII:**

File attributes, Simple filters, Filtering using simple expressions **7 hrs.**

**UNIT - VIII:**

awk-Advanced filter **7 hrs.**

**TEXT BOOKS:**

1. *Sumitabha Das*, “Unix - concepts and Applications”, 4th edition, 2006, McGraw Hill,

**REFERENCE BOOKS:**

1. *Behrouza A. and Richard Gilberg.*, Unix and shell Programming”, Thomson.
2. *M. G. Venkatesh Murthy* “Unix and shell Programming”, Pearson Education.

## JAVA AND INTERNET PROGRAMMING

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 3.4 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT - I:

History and design features of JAVA, how java works, basics of JAVA, Applications and Applets, using the tools in JDK, java doc, java, jdb etc. JAVA Language keywords, constants, variables and Data Types. Operators and Expressions, Decision making, branching and Looping, Labeled Loops Statement, Jump statements: Break, Continue, and Return. Arrays and Strings-Creating an Arrays, one and two Dimension, Arrays , String Array, String and String Buffer Classes, Wrapper Classes. **8 hrs.**

### UNIT – II:

Classes, Objects and Methods Defining a class, adding variables and Methods, creating Objects constructors, class inheritance, Basics types, using super, multi level hierarchy, abstract and final classes, object class, packages and interfaces, Access protection, Extending interfaces, packages. Exception Handling, Fundamentals exception types, uncaught exceptions, throws, throw, try -catch, final, built in exceptions, creating your own exceptions. **8 hrs.**

### UNIT - III:

Web Design -HTML and XML Languages, web browsers, coding for multiple screen resolutions, bandwidth concerns. Web Site Design Principles- Design for the medium, design the whole website, design for the user, design for the screen, Planning the Site, planning site navigation, creating page templates, web typography- type design principles, controlling typography with the <FONT> element and Cascading Style Sheets, styling with CSS, graphics and Color, HTML frames, publishing and maintaining your websites. **6 hrs.**

### UNIT - IV:

Applet Programming - Creating and executing Java applets, inserting applets in a web page, Java security. **6 hrs.**

### UNIT - V:

Multithreading Fundamentals, Java Thread model priorities, synchronization, messaging, thread class, Runnable interface, Interthread communication, suspending, resuming and stopping threads. Input Output -Basics, Streams, Byte and Character streams, predefined streams, reading and writing from console and files .Using standard Java Packages (lang,util,io) Networking -Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Datagram programming. **6 hrs.**

### UNIT - VI:

AWT Classes, Event Handling and Swing classes, AWT Programming, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, Handling image, animation. sound and video Event Handling-Different mechanism, the Delegation Event Model, Event Classes. Event Listener interfaces, Adapter and Inner Classes Java Swing -JApplet, Icons and Labels, Text fields, Buttons, Combo Boxes, Tabbed and Scroll Panes, Trees, Tables. **6 hrs.**

### UNIT - VII:

JDBC -Setting the JDBC connectivity with a backend database. RMI -Two tier and Multitier Architecture, Object serialization, RMI Fundamentals. **6 hrs.**

### UNIT - VIII:

Programming using Java, RMI Classes and interfaces. Servlets-Background, Life Cycle, Java Servlet Development kit, Servlet API, Handling HTTP Requests and responding, Using Cookies, Session Tracking and security issues. **6 hrs.**

**TEXT BOOK:**

1. *Patrick Naughton And Herbert Schildt*, “Java The Complete Reference”, TMH Publication.

**REFERENCES:**

1. *Cay S. Horstmann and Gary Cornell*, “Core JAVA 2”, Volume-I, 7/e, Pearson Education.
2. *Cay S. Horstmann and Gary Cornell*, “Core JAVA 2”, Volume-II, 7/e, Pearson Education (2006)
3. *Bruce Eckel*, “Thinking in Java”, 3/e, Prentice Hall(2006).
4. *C. Muthu*, “Programming with JAVA”, Thomson-Vijay Nicole.
5. *Partrick Naughton, Herbert Schidlt*, “JAVA 2 - The Complete Reference”, 4/e, (2001 ) Tata McGraw Hill.
6. *C. Xavier*, “World Wide Web Design with HTML”, Tata McGraw Hill
7. *Joel Sklar*, “Principles of Web Design, Web Warrior series”, Thomson Learning.
8. *Deitel and Nieto*, “Internet & World Wide Web-How to Program”, PHI.



**COMPUTER GRAPHICS AND VISUALIZATION  
UNIX AND SHELL PROGRAMMING**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 3.6 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

Graphics assignments to be implemented using C or C++. Shell Programming.

**JAVA PROGRAMMING AND WEB DESIGNING**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 3.7 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

Familiarity with JAVA languages and scripting (JAVA Script/VB Scripts) Language to be gained through programming assignments.

**OBJECT ORIENTED ANALYSIS AND DESIGN USING UML**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 4.1 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

**UNIT - I:**

**Complexity:** The Internet Complexity of software, the Structure of Complex Systems, Bringing order to Chaos On Designing Complex Systems. **8 hrs.**

**UNIT - II:**

**The Object Model:** The Evolution of the Object Model, Elements of the Object Model, Applying the Object Model. **8 hrs.**

**UNIT - III:**

**Classes And Objects:** The Nature of an Object, Relationships Among Objects, The Nature of a Class. Relationships Among Classes, The interplay of Classes and objects, Building Quality Classes and Objects. **6 hrs.**

**UNIT- III:**

**Classification:** Importance of proper Classification, Identifying Classes and Objects, Key

Abstraction And Mechanisms.

**6 hrs.**

**UNIT - IV:**

**Notation:** Elements of the Notation, Class Diagrams, State transition Diagrams, Object Diagrams, Interaction Diagrams, Module Diagrams, Process Diagrams, Applying the Notations.

**6 hrs.**

**UNIT - V:**

**The Process:** Principles, the Micro Development process, the Macro Development Process.

**6 hrs.**

**UNIT - VI:**

**Pragmatics:** Management and Planning, Staffing, Release Management, Reuse, Quality Assurance and Metrics, Documentation, Tools, the Benefits and Risks of Object-Oriented Development.

**6 hrs.**

**UNIT - VII:**

**Applications:** Data Acquisition: Weather Monitoring Station; Client Server Computing: Inventory Tracking.

**6 hrs.**

**UNIT - VIII:**

**Object Oriented Programming Languages:** Smalltalk, Object Pascal, C++, Ada.

**6 hrs.**

**TEXT BOOK:**

1. *Grady Booch*, "Object-Oriented Analysis and Design", 2/e, Pearson Education.

**REFERENCES:**

1. *G. Booch, J. Rumbaugh and I. Jacobson*, The Unified Modeling Language User GUIDE. Pearson Education.
2. *Simon Bennett, MCrobb Rayfarmer*, "Object Oriented Systems Analysis and Design USI"UML, 2/e, Tata McGraw Hill.
3. *Ali Bahrami*, "Object-oriented systems Development", McGrawHill.
4. *Craig Larman*, Applying UML and Patterns, Pearson Education.
5. *Blaha and Rumbaugh*, "Object Oriented Modeling and Design with UML", 2/e, PHI.
6. *H. Erikson, M Penker, B. Lyons, and D. Fado*, UML 2 Tool Kit, Wiley Publishing.
7. *Meilir Page-Jones*, "Fundamentals of Object Oriented Design in UML", Pearson Education.
8. *W. Richard Stevens*, "Using UML: Software Engineering with Objects and Components", 11 Pearson Education.

## SYSTEM SOFTWARE & COMPILER DESIGN

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 4.2 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### UNIT – I:

**Machine Architecture:** Introduction, System Software & Machine Architecture, Simplified Instructional Computer (SIC) SIC Machine Architecture. **7 hrs.**

### UNIT- II:

**Assemblers:** Basic Assembler Function, Machine Dependent & Machine independent Assembler Features, One pass Assembler, Multi pass, Assemblers Features –Instruction Formats & Addressing Modes . **6 hrs.**

### UNIT - III:

**Loaders and Linkers:** Basic Assembler Function Design of an Absolute Loader, A Simple Bootstrap loader, Machine Dependent Loader Features, Relocation linkage editors, dynamic Linking, Bootstrap loaders. **7 hrs.**

### UNIT - IV:

**Macro Processor:** Basic macro processors functions, macro Definition & Expansion, Machine-Independent, macro processors features, Concatenation of macro parameters. **6 hrs.**

### UNIT - VI:

**Introduction to Compiler:** Language Processors, The Structure of a Compiler, The evolution of programming Languages, Lexical analysis, The Role of Lexical Analyzer, specification of Tokens, Recognition of Tokens. **7 hrs.**

### UNIT - VI:

**Syntax Analysis:** The Role of Context free Grammars, writing a Grammar, Top down Parsing, Bottom up Phrasing, LR Pressers. **6 hrs.**

### UNIT - VII :

**Intermediate Code Generation:** Intermediate languages, Declarations, Assignment statements ,Boolean expressions. **7 hrs.**

### UNIT - VIII:

**Run-Time Environments:** Storage organization, stack allocation of space, Access to non local names. **7 hrs.**

### TEXT BOOKS:

1. *Leland. L.* “Black System Software”, 3/e, pearson Education.
2. *Alfred. V. Aho, Ravi Sethi, Jeffrey. D. Ullam,* “Compilers Principles, Techniques & Tools”.

### REFERENCES:

1. *D.M.Dhamdhare,* “System Programming & Operating Systems”. Tata McGraw Hill.
2. *N. Fischer, Richard.J. Leblanc,* “Crafting compilers with Charles., Jr. Person Education.
3. *Andrew W* “Modern Compiler Implementation in C”, Apple Cambridge University Press.
4. *Kenneth C,* “Compiler Construction Principles & practice”, London- Thomson Education.

## ELECTIVE – I

### MOBILE COMPUTING

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.3.1 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

#### UNIT - I:

**Introduction:** Applications, History of Wireless communication, A simplified reference model.

**6 hrs.**

#### UNIT - II:

**Wireless Transmission:** Frequencies, Signals, Antennas, Signal propagation, Multiplexing, modulation, Spread spectrum, Cellular systems.

**6 hrs.**

#### UNIT - III:

**Medium Access Control:** Motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA.

**7 hrs.**

#### UNIT - IV:

**Satellite Systems:** Basics, Routers, Location, Handover, examples.

**6 hrs.**

#### UNIT - V:

**Broadcast systems:** Cyclic representation of data, Digital audio & video broadcasting

**6 hrs.**

#### UNIT - VI:

**Wireless LAN:** Infrared V/S Radio transmission, Infrastructures and ad hoc Networks, IEEE 802.11, Hiperlan, Bluetooth.

**7 hrs.**

#### UNIT - VII:

**Wireless ATM:** Wireless ATM working group, WATM services, references model, Functions, radio access layer, Handover, Location Management, Addressing, Mobile quality of services, Access point control protocol.

**7 hrs.**

#### UNIT - VIII:

**Mobile Network Layer:** Mobile IP, Dynamic host configuration protocol, Ad hoc networks. Mobile Transport layer, Support for mobility and wireless application protocol.

**7 hrs.**

#### TEXT BOOK :

1. Schiller J. H. "Mobile Communications", Addison Wesley.

#### REFERENCES :

1. Stuber G. L., Principles of Mobile Communications, Academic Press 1996
2. Rappapert T. S., Wireless Communication Principles & Practices, Pentacle Hall, 1996.

## OPTIMIZATION TECHNIQUES

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.3.2 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

### UNIT – I:

**Theory of Probability:** Sample space events, classical & axiomatic definition of probability, condition probability, addition Multiplication & total probability theorems, Bayes theorem. **7 hrs.**

### UNIT – II:

**Probability Distributions:** Random variables, discrete & continuous random variable. Bernoulli, binomial, hyper geometric & Poisson distribution. normal, exponential, uniform & weibull distribution. **6 hrs.**

### UNIT - III:

**Linear Programming:** Introduction, Formulation of LPP. General model of LLP, slack & surplus variables. **7 hrs.**

### UNIT - IV:

Canonical & standard form of LPP, Graphical method; standard LLP & Basic solution. Fundamental Theorem of LPP. Simplex algorithm, Big-m method. **6 hrs.**

### UNIT - V:

**Concept of Duality:** Formation of Dual LLP. Duality theorem, advantage of Duality, dual simplex algorithm. **7 hrs.**

### UNIT - VI:

**Transport Problem:** Introduction, transport problem, loops in transportation table, Method for finding initial basic feasible solution. Test for optimality, unbounded transport problem. **6 hrs.**

### UNIT - VII:

**Assignment Problem:** Mathematical form of the assignment problem, method of solving assignment problem, Variations of the Assignment problem. **7 hrs.**

### UNIT - VIII:

**Game Theory:** Introduction, 2x2 game, solution of game, Network analysis by linear programming, Browns algorithm-shortest route, & maximal flow problems, CPM & PERT. **6 hrs.**

### TEXT BOOK:

1. TAHA, H. "Operation Research", Collin McMillan, New edition.

### REFERENCES:

1. Sharma J.K. "Operation Research, Theory & Application", Holden day.
2. Panneerselvam R., "Operation Research", PHI New Edition.
3. Kishore Trivedi, "Probability & Statistical with Reliability & Queuing & computer science application", Prentice Hall.
4. Hillier F.S & Lieberman G.J., "Operation Research", Holden day.

## ARTIFICIAL INTELLIGENCE

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.3.3 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

### UNIT - I:

**Definition of Artificial Intelligence:** Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem-solving: Problem-solving agents; Example problems; Searching for solution; Uninformed search strategies. **6 hrs.**

### UNIT - II:

**Informed Search, Exploration, Constraint Satisfaction, Adversial Search** Informed search strategies; Heuristic functions; On-line search agents and unknown environment. Constraint satisfaction problems; Backtracking search for CSPs. Adversial search: Games; Optimal decisions in games; Alpha-Beta pruning. **7 hrs.**

### UNIT - III: Logical Agents:

Knowledge-based agents; The wumpus world as an example world; Logic; logic Reasoning patterns in propositional logic; Effective propositional inference; based on propositional logic. **6 hrs.**

### UNIT - IV:

**First-Order Logic, Inference in First-Order Logic** Representation revisited; Syntax and semantics of first-order logic; Using first-order logic; Knowledge engineering in first-order logic. Propositional versus first-order inference. **7 hrs.**

### UNIT - V:

**Inference in First-Order Logic** Forward chaining; Backward chaining; Resolution. **6 hrs.**

### UNIT - VI:

**Knowledge Representation:** Ontological engineering; Categories and objects; Actions, situations, and events; Mental events and mental objects; The Internet shopping world; Reasoning systems for categories. **7 hrs.**

### UNIT - VII:

**Planning, Uncertainty, Probabilistic Reasoning:** The problem; Planning with state-space approach; Planning graphs; Planning with propositional logic. **6 hrs.**

### UNIT - VIII: Learning, AI:

**Present and Future Learning:** Forms of Learning; Inductive learning; Learning decision trees Ensemble learning; Computational learning theory. **7 hrs.**

### TEXT BOOK:

1. *Stuart Russel, Peter Norvig*, "Artificial Intelligence A Modern Approach", 2<sup>nd</sup> Edition, 2003, Pearson Education.

### REFERENCE BOOKS:

1. *Elaine Rich, Kevin Knight*, "Artificial Intelligence", 2<sup>nd</sup> Edition, Tata McGra Hill, 1991.
2. *Nils J. Nilsson*, "Principles of Artificial Intelligence", 1980, Elsevier.

## DIGITAL IMAGE PROCESSING

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.3.4 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

### UNIT - I:

**Digital Image and its properties:** Basic concepts, Image digitization, Digital image properties. **5 hrs.**

### UNIT - II:

**Image Pre-Processing:** Brightness and geometric transformations, local preprocessing. **8 hrs.**

### UNIT - III:

**Segmentation:** Thresholding, Edge-based segmentation, Region based segmentation, Matching. **12 hrs.**

### UNIT - IV:

**Image enhancement in the spatial domain:** Background, Some basic gray level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters. **4 hrs.**

### UNIT - V:

**Image enhancement in the frequency domain:** Background, Introduction to the Fourier transform and the frequency domain, Smoothing, Frequency-Domain filters, Sharpening Frequency Domain filters, Homomorphic filtering. **4 hrs.**

### UNIT - VI:

**Image compression:** Fundamental, Image compression models, Elements of information theory, Error-Free Compression, Lossy compression. **6 hrs.**

### UNIT - VII:

Region identification, Contour-based shape representation and description Region based shape representation and description, Shape classes. **8 hrs.**

### UNIT - VIII:

**Morphology:** Basic morphological concepts, Morphology principles, Binary dilation and erosion, Gray-scale dilation and erosion, Morphological segmentation and watersheds. **5 hrs.**

### TEXT BOOK:

1. *Milan Sonka, Vaclav Hlavan and Roger Boyle*, "Image Processing, Analysis and Machine Vision", Thomson Learning, Brooks/Cole, 2<sup>nd</sup> Edition. 2001. [Chapters 2,4 (4.1 to 4.3), 5 (5.1 to 5.4), 6, 11 (11.1 to 11.4, 11.7)].
2. *Rafel C Gonzalez and Richard E Woods*, "Digital Image Processing", Pearson Education, 2<sup>nd</sup> Edition, 2003. [Chapters 3 (3.1 to 3.7), 4 (4.1 to 4.5), 8 (8.1 to 8.5)]

### REFERENCE BOOKS:

1. *Anil K Jain*, "Fundamentals of Digital Image Processing", 1997, Pearson Education / Prentice-Hall of India Pvt., Ltd.
2. *B. Chanda D Dutta Majumder*, "Digital Image Processing and Analysis", 2002, Prentice-Hall, India.

## NEURAL NETWORKS AND FUZZY SYSTEMS

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.3.5 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

### UNIT - I:

**Neural Networks And Fuzzy Systems:** Neural And Fuzzy Machine Intelligence; Fuzziness As Multivalence, Dynamical Systems Approach To Machine Intelligence; Intelligent Behaviour As Adaptive Model - Free Estimation. **7 hrs.**

### UNIT - II:

**Neural Dynamics – Activations And Signals:** Neurons As Functions, Signal Monotonicity, Biological Activations And Signals, Neuron Field, Neuron Dynamical System, Common Signal Function. **6 hrs.**

### UNIT - III:

**Neural Dynamics – Activations Models:** Neuronal Dynamical Systems, Additive Neuronal Dynamics, Additive Neuronal Feedback, Additive Activation Models, Additive Bivalent Models. **7 hrs.**

### UNIT - IV:

**Synaptic Dynamics – Unsupervised Learning:** Learning As Encoding, Change And Quantization, Four Unsupervised Learning Laws, Probability Spaces And Random Processing, Stochastic Unsupervised Learning Stochastic, Competitive Learning. **7 hrs.**

### UNIT - V:

**Synaptic Dynamics And Supervised Learning:** Supervised Function Estimation, Supervised Learning As Operant Conditioning, Supervised Learning As Stochastic Pattern Learning With Known Class Membership And As Stochastic Approximation. **7 hrs.**

### UNIT - VI:

**Fuzziness Versus Probability:** Fuzzy Sets And Systems, Fuzzyness In A Probabilistic World, Randomness Vs Ambiguity, The Universe As A Fuzzy Set, Geometry As A Fuzzy Set. **6 hrs.**

### UNIT - VII:

**Fuzzy Associative Memories:** Fuzzy System As Between Cube Mapping, Fuzzy And Neural Functions Estimation. **6 hrs.**

### UNIT - VIII:

**Comparison Of Fuzzy And Neural Truck Backer – Upper Control Systems:** Fuzzy And Neural Control System, Backing Up A Truck. **6 hrs.**

### TEXT BOOK:

1. *Bart Kosko*, “Neural Networks And Fuzzy Systems - A Dynamical Systems Approach To Machine Intelligence”, PHI (L996).

### REFERENCES:

1. *Kaufman*, “Fuzzy Sets And Systems”, Academic Press.
2. *Stamatios V. Kartalopoulos*, “Understanding Neural Networks And Fuzzy Logic”, PHI
3. *S. Rajashekharan, G.A.Vijayalakshmi Pai*, “Neural Networks, Fuzzy Logic And Genetic Algorithms”, PHI
4. *H.J.Zimmerman*, “Fuzzy Sets Theory And Its Applications”, KAP.



## ELECTIVE - II

### PRINCIPLES OF PROGRAMMING LANGUAGE

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.4.1 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

#### UNIT - I:

**Data types:** Properties of type and objects, data objects, Variables and Constants, Data types, Specification and Implementations of elementary data types, declaration, Type checking and type conversion, assignment and initialization. **7 hrs.**

#### UNIT - II:

Scalar data types, Structured data types, Vectors and arrays, records, lists, Character string, files input, input – output. **6 hrs.**

#### UNIT - III:

**Sequence Control:** Implicit and Explicit sequence control, Sequencing with Arithmetic expressions, Sequence control between statements. **6 hrs.**

#### UNIT - IV:

**Subprogram Control:** Subprogram sequence control, attributes of data control, shared data in subprograms, Advances in language design, Comparative study of Programming languages. **6 hrs.**

#### UNIT - V:

**Introduction to compiling:** Analysis of source program, Phases of a compiler, Processors Assemblers, Loaders, Link editors, Grouping of Phases, Compiler construction tools, A simple one pass Compiler. **7 hrs.**

#### UNIT - VI:

**Lexical Analysis:** Role of Lexical Analyzer, Input buffering, Specification and recognition of Tokens, LEX symbol tables. **6 hrs.**

#### UNIT - VII:

**Parsing:** Role of parser, Context free grammars, writing a grammar, Top down parsing, Recursive descent and predictive parsers, Bottom up parsing, Shift reduce parsers, Operator precedence parsing, LR parsers. **7 hrs.**

#### UNIT - VIII:

Syntax directed translation, type checking, Run time environments, Intermediate code generation, Code generation and code optimization. **7 hrs.**

#### **TEXT BOOK :**

1. *Pratt, T. W. and Zelkowitz*, “Programming Language: Design and Implementation”, 3rd Edition, PHI 1996.
2. *Alfred V.Aho, Ravi Sethi and Jeffrey D. Ullman*, “Compilers-Principles, Techniques and Tools”, Addison-Wesley (1999).

#### **REFERENCES :**

1. *Ravi Sethi*, “Programming Languages-Concepts and Constructs”, Addison-Wesely (1990)
2. *Ellis Horowitz*, “Fundamentals of Programming Languages”, Galgotia Publication
3. *Dhamdhare D.M*, “Compiler Construction, Principles and Practice”, Mc Millan India, (1981).

## THEORY OF COMPUTING

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.4.2 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

### UNIT - I:

**Introduction:** Sets, Relations, Functions; Strings And Their Properties; Automation, Transition Systems, Nondeterministic Finite State Machines, Equivalence Of NDFA , Mealy Moore Models.

**6 hrs.**

### UNIT - II:

**Formal Languages and Regular Grammars:** Chomsky Classification Of Languages, Languages And Their Relation, Operations On Languages, Languages And Automata, Regular Expressions, Finite Automata And Regular Expressions, Pumping Lemma, Regular Sets And Regular Grammars.

**7 hrs.**

### UNIT - III:

**Context free languages :** Context Free Languages And Derivation Trees, Ambiguity In Context Free Grammars, Normal Forms For Context Free Grammars.

**6 hrs.**

### UNIT - IV:

**Context free languages continued:** Pumping Lemma, Decision Algorithms, Push Down Automata, Push Down Automata And Context Free Languages, Parsing And Push Down Automata.

**7 hrs.**

### UNIT - V:

**Turing machines:** Turing Machine Model, Representation Of Turing Machines, Language Acceptability, Design Of Turing Machines.

**7 hrs.**

### UNIT - VI:

**Linear bounded Automata:** The Model Of Linear Bounded Automation, Turing Machines And Type 0 Grammars.

**6 hrs.**

### UNIT - VII:

**Linear bounded Automata (continued):** Linear Bounded Automata And Languages, Halting Problem Of Completeness, NP – Completeness.

**6 hrs.**

### UNIT - VIII:

**LR (k) grammars, computability** – Primitive Recursive Functions, Recursive Functions, Partial Recursive Functions And Turing Machines.

**7 hrs.**

### TEXT BOOK:

3. *J P Hopcroft, J D Ullman*, “Introduction To Automata, Languages And Computation”, Narosa Publicatons.

### REFERENCES:

1. *K.L.P. Mishra and N. Chandrashekharan*, “Theory of Computer Science”, 2/e, PHI.
2. *Michael Sipser*, “Introduction to the Theory of Computation”, Thomson Learning.
3. *John C Martin*, “Introduction to Languages and Theory of Computation”, 2<sup>nd</sup> Edition, McGraw Hill.

## EMBEDDED COMPUTING SYSTEMS

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.4.3 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

### UNIT - I:

**Introduction to Embedded Systems** - An embedded system; Processor in the system; Embedded hardware units and devices in a system; Embedded software in a system; Examples of embedded systems; Embedded system-on-Chip (SoC) and use of VLSI circuit design technology; Complex systems design and processors; Design process in embedded system. **7 hrs.**

### UNIT - II:

**Introduction to Embedded Systems – 2, Devices:** Formalization of system design; Design process and design examples; Classification of embedded systems; Skills required for an embedded system designer. I/O types and examples; Serial communication devices; Parallel device ports; Sophisticated interfacing features in device ports. **7 hrs.**

### UNIT - III:

**Devices -2, Communication Buses for Device Networks:** Wireless devices; Timer and counting devices; Watchdog timer; Real time clock; Networked embedded systems; Serial bus communication protocols; Parallel bus device protocols; Internet enabled systems; Wireless and mobile system protocols.

**6 hrs.**

### UNIT - IV:

**Device Drivers and Interrupts Service Mechanism** : Device access without interrupts; ISR concept; Interrupt sources; Interrupt servicing Mechanism; Multiple interrupts; Context switching and the periods for context-switching; Classification of interrupt service mechanisms; Direct memory access; Device drivers programming. **7 hrs.**

### UNIT – V:

**Program Modeling Concepts** : Program models; DFG models; State machine programming models for event controlled program flow; Modeling of multiprocessor systems. **6 hrs.**

### UNIT – VI:

**Inter-Process Communication, Synchronization** Multiple processes in an application; Multiple threads in an application; Tasks and task states; Task and data; Distinctions between functions, ISRs and tasks; Concept of semaphores; Shared data; Inter Process Communication; Signal function; Semaphore functions. **6 hrs.**

### UNIT - VII:

**Real-time Operating systems:** Operating System services; Process management; Timer functions; Event functions; Memory management; Device, file and I/O sub-systems management; Interrupt routines in RTOS environment; Real-Time Operating Systems; Basic design using an RTOS; RTOS task scheduling models, interrupt latency and response times of the tasks as performance metrics; OS security issues. **7 hrs.**

### UNIT - VIII:

**Embedded Software Development** : Introduction; Host and target machines; Linking and locating software; Getting embedded software in to the target system; Issues in hardware-software design and co-design; Testing on host machine; Simulators; Laboratory tools. **6 hrs.**

**TEXT BOOKS:**

1. *Rajkamal*, “Embedded Systems Architecture, Programming and Design”, 2<sup>nd</sup> Edition, Tata McGraw Hill, 2008.

**REFERENCE BOOKS:**

1. *Wayne Wolf*, “Computers as Components Principles of Embedded Computer System Design”, Elsevier, 2005.
2. *Tammy Noergaard*, “Embedded Systems Architecture”, Elsevier, 2005.
3. *Steve Heath*, “Embedded Systems Design”, 2<sup>nd</sup> Edition, Elsevier, 2003.
4. *Dr. K.V.K.K. Prasad*, “Embedded/Real-Time Systems: Concepts, Design and Programming – The Ultimate Reference”, Dreamtech. Press, 2004.
5. *Michael J.Point*, “Embedded C”, Pearson Education, 2002.

## DATA WAREHOUSING AND DATA MINING

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.4.4 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

### UNIT - I:

**Introduction:** Relation To Statistics, Databases- Data Mining Functionalities-Steps In Data Mining Process-Architecture Of A Typical Data Mining Systems- Classification Of Data Mining Systems - Overview Of Data Mining Techniques.

### UNIT - II:

**Data Preprocessing and Association Rules:** Data Preprocessing-Data Cleaning, Integration, Transformation, Reduction, Discretization Concept Hierarchies-Concept Description:

### UNIT - III:

**Data Preprocessing and Association Rules Continued:** Data Generalization And Summarization Based Characterization- Mining Association Rules In Large Databases.

### UNIT - IV:

**Predictive Modeling:** Classification And Prediction: Issues Regarding Classification And Prediction-Classification By Decision Tree Induction-Bayesian Classification -Other Classification Methods-Prediction-Clusters Analysis:

### UNIT - V:

**Predictive Modeling Continued:** Types Of Data In Cluster Analysis- Categorization Of Major Clustering Methods: Partitioning Methods –Hierarchical Methods

### UNIT - VI:

**Data Warehousing:** Data Warehousing Components -Multi Dimensional Data Model- Data Warehouse Architecture.

### UNIT - VII:

**Data Warehouse Implementation:** Data Warehouse Implementation- -Mapping the Data Warehouse to Multiprocessor Architecture- OLAP.-Need- Categorization of OLAP Tools.

### UNIT - VIII:

**Applications:** Applications of Data Mining-Social Impacts Of Data Mining-Tools-An Introduction To DB Miner-Case Studies-Mining WWW-Mining Text Database-Mining Spatial Databases.

### TEXT BOOKS:

1. *Jiawei Han, Micheline Kamber*, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, 2002.

### REFERENCES:

1. *Alex Berson, Stephen J. Smith*, "Data Warehousing, Data Mining, & OLAP", Tata McGraw-Hill, 2004.
2. *Usama M. Fayyad, Gregory Piatetsky - Shapiro, Padhraí Smyth And Ramasamy Uthurusamy*, "Advances In Knowledge Discovery And Data Mining", The M.I.T Press, 1996.
3. *Ralph Kimball*, "The Data Warehouse Life Cycle Toolkit", John Wiley & Sons Inc., 1998.
4. *Sean Kelly*, "Data Warehousing In Action", John Wiley & Sons Inc., 1997.

## MODELING AND SIMULATION

|                            |            |            |    |
|----------------------------|------------|------------|----|
| Subject Code               | C.S. 4.4.5 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04         | Exam Hours | 03 |
| Total No. of Lecture Hours | 52         | Exam Marks | 80 |

### UNIT - I:

**Introduction:** Definition of system and simulation, Merits and demerits of simulation, Areas of application, Types of systems, various types of models to represent them, Discrete and Continuous systems, Steps in simulation study, Simulation Examples, Concepts of system Clocks, Event scheduling Vs Time advance algorithms. **8 hrs.**

### UNIT - II:

**Elements of Probability:** Sample Space and Events, axioms of probability, conditional probability and independence. Addition, multiplication, total and Bayes' theorems. **8 hrs.**

### UNIT - III:

Statistical Models in Simulation. Random variables, discrete distributions- Binomial, Poisson and Geometric distributions, continuous distributions-Normal and Exponential distributions, Inverse transformation techniques, convolution method, Acceptance-Rejection technique, queuing models. random number generation, test for random numbers. **6 hrs.**

### UNIT - IV:

Immolation Software Selection of simulation software, simulation in C++, Simulation in GPSS. experimentation and statistical analysis tools, trends in simulation software. **6 hrs.**

### UNIT - V:

**Input Modeling:** Data collection, Distribution functions such as Normal, Poisson, exponential Distributions, Goodness of fit tests, Chi square test Input models without data, multivariate and time series input models. **6 hrs.**

### UNIT - VI:

**Verification and Validation of Models:** Guidelines for verification of models, their calibration and Validation, Face validity, Validation of model assumptions, validating input-output transformations, Use of historical Data. **6 hrs.**

### UNIT - VII:

**Evaluation of Simulation Experiments:** Length of simulation run, static and dynamic stochastic simulations. **6 hrs.**

### UNIT - VIII:

Elimination of transients, Auto correlated observations, variance reduction techniques. **6 hrs.**

### TEXT BOOK:

1) *Geoffrey Gordon*, "System Simulation", 2/e, PHI.

### REFERENCES:

1. *Jerry Banks. John S. Carson & Barry L Nelson* - Discrete Event system simulation, 3/e, Pearson Education
2. *Narsingh Deo*, "System simulations with Digital computers", PHI.
3. *James A Payne*, "Introduction to Simulation: Programming Techniques & Methods of Analysis", McGraw Hill.
4. *Bernard Zeigler, Herbert Praehofer, Tag Gon Kim*, "Theory of Modeling and Simulation", Academic Press.
5. *Kishore. Trivedi*, "Probability and Statistics with Reliability, Oueuing and Computer Science Applications", PHI.
6. *John E. Freund's*, "Mathematical Statistics", 7/e, PHI.

## **SYSTEME SOFTWARE LAB**

|                            |          |            |    |
|----------------------------|----------|------------|----|
| Subject Code               | C.S. 4.6 | IA Marks   | 20 |
| No. of Lecture Hrs./Week   | 04       | Exam Hours | 03 |
| Total No. of Lecture Hours | 52       | Exam Marks | 80 |

### **PROJECT WORK**

Individual project to be carried out under the supervision of the guide in the Department.

Software to be used as front end: VB/C++/JAVA.

Software to be used as back end: Oracle/SQL/MS Excess/Visual Foxpro.

Any other software/Hardware projects of practical relevance may also be encouraged.