



**JSS COLLEGE OF ARTS, COMMERCE & SCIENCE  
(AUTONOMOUS)**

**OOTY ROAD, MYSURU-570 025**

**(Autonomous under University of Mysore: Re-accredited by NAAC with 'A' Grade)**

**Choice Based Credit System and CGPA**

**MASTERS DEGREE  
in  
COMPUTER SCIENCE**

**Syllabus**

**2017**

**Postgraduate Department of Computer Science**

**JSS College of Arts, Commerce and Science**

**Ooty Road, Mysore-25**

**2017-2019**

## M.Sc. in Computer Science – 2017

### I Semester

Course Code	Course	L:T:P	Credit Value
CSC101	HC1 (Data Structures and Algorithms)	3:0:1	4
CSC102	HC2 (System Software)	2:1:1	4
CSC103	HC3 (Computer Networks)	2:1:1	4
CSC104	SC1		4
CSC105	SC2		4
	<b>TOTAL</b>		<b>20</b>

### II Semester

Course Code	Course	L:T:P	Credit Value
CSC201	HC4 (Analysis and Design of Algorithms)	2:1:1	4
CSC202	HC5 (Operating System and Unix)	2:0:2	4
CSC203	HC6 (Computer Graphics)	3:0:1	4
CSC204	SC3		4
CSC205	SC4		4
	<b>TOTAL</b>		<b>20</b>

### III Semester

Course Code	Course	L:T:P	Credit Value
CSC301	HC7 (Software Engineering)	3:1:0	4
CSC302	HC8 (Theory of Languages)	3:1:0	4
CSC303	HC9 (Database Management System)	2:1:1	4
CSC304	SC5 / Term Work		4
CSC305	SC6 (Open Elective *****)		4
	<b>TOTAL</b>		<b>20</b>

### IV Semester

Course Code	Course	L:T:P	Credit Value
CSC401	HC10 (Major Project)	0:1:7	8
CSC402	SC7		4
CSC403	SC8		
	<b>TOTAL</b>		<b>16</b>

### \*\*\*\* Open Elective Course: III Semester

Course Code	Course	L:T:P	Credit Value
CSC305	OE- Computer Fundamentals / Programming with C	2:0:2	4

**HARD CORE:**

<b>Sl. No.</b>	<b>Course</b>	<b>L:T:P</b>	<b>Credit Value</b>
1	Computer Networks	2:1:1	4
2	Computer Graphics	3:0:1	4
3	Data Structures and Algorithms	3:0:1	4
4	Analysis and Design of Algorithms	2:1:1	4
5	DBMS	2:1:1	4
6	Software Engineering	3:1:0	4
7	Theory of Languages	3:0:1	4
8	Operating System and Unix	2:0:2	4
9	System Software	3:1:0	4

**SOFT CORE:**

<b>Sl. No.</b>	<b>Course</b>	<b>L:T:P</b>	<b>Credit Value</b>
1	Principles of Programming Language and C	2:1:1	4
2	Internet Technology	2:0:2	4
3	Java Programming	2:0:2	4
4	Multimedia	3:1:0	4
5	Microcontroller	3:1:0	4
6	Discrete Mathematics	3:1:0	4
7	Simulation and Modeling	3:1:0	4
8	Operations Research	3:1:0	4
9	Mobile Communication	3:1:0	4
10	C++	2:0:2	4
11	Pattern Recognition	3:0:1	4
12	Image Processing	2:1:1	4
13	Software Testing	3:0:1	4
14	Computational Techniques	3:0:1	4
15	Graph Theory	3:1:0	4
16	OOAD	2:1:1	4

17	Probability and Statistics	3:1:0	4
18	Data Mining	2:1:1	4
19	Artificial Intelligence	3:1:0	4
20	.NET Technologies	2:0:2	4
21	Object Oriented Modeling and Design with UML	2:1:1	4
22	Android Application Development	2:0:2	4
23	Advanced Database Management Systems	2:1:1	4
24	Compiler Design	3:0:1	4

# **COMPUTER NETWORKS**

## **UNIT 1**

**USES OF COMPUTER NETWORK:** Business Applications, Home Applications, Mobile Users, Social Issues

**NETWORK HARDWARE:** Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Wireless Networks, Home Networks, Internetworks

**NETWORK SOFTWARE:** Protocol Hierarchies, Design Issues for the Layers, Connection-Oriented and Connectionless Service, Service Primitives, the Relationship of Services to Protocols

**REFERENCE MODELS:** The OSI Reference Model, The TCP/IP Reference Model, A comparison of OSI and TCP/IP Reference Model

## **UNIT 2**

### **THE PHYSICAL LAYER**

**THE THEORETICAL BASIS FOR DATA COMMUNICATION:** Fourier Analysis, Bandwidth-Limited Signals, The Maximum Data Rate of a Channel

**GUIDED TRANSMISSION MEDIA:** Magnetic Media, Twisted Pairs, Coaxial Cable, Fiber Optics

**WIRELESS TRANSMISSION:** The Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared and Millimeter Waves, Light wave Transmission

**COMMUNICATION SATELLITES:** Geostationary Satellites, Medium-Earth Orbit Satellites, Low-Earth Orbit Satellites, Satellites versus Fiber

### **THE DATA LINK LAYER**

**DATA LINK LAYER DESIGN ISSUES:** Services Provided to the Network Layer, Framing, Error Control, Flow Control

**ERROR DETECTION AND CORRECTION:** Error-Correcting Codes, Error-Detecting Codes

**ELEMENTARY DATA LINK PROTOCOLS:** A Utopian Simplex Protocol, A Simplex Stop-and-Wait Protocol

**SLIDING WINDOW PROTOCOLS:** A One-Bit Sliding Window Protocol, A Protocol Using Go-Back-N

## **UNIT 3**

### **THE MEDIUM ACCESS CONTROL SUBLAYER**

THE CHANNEL ALLOCATION PROBLEM: Static Channel Allocation, Dynamic Channel Allocation

MULTIPLE ACCESS PROTOCOLS: ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Limited-Contention Protocols

ETHERNET: Ethernet Cabling, Manchester Encoding, The Ethernet MAC sub layer protocol, the binary exponential back off algorithm, Ethernet Performance, Switched Ethernet, IEEE 802.2: Logical Link Control

### **THE NETWORK LAYER**

NETWORK LAYER DESIGN ISSUES: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual-Circuit and Datagram Networks

ROUTING ALGORITHMS: The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing

CONGESTION CONTROL ALGORITHMS: Approaches to Congestion Control, Traffic-Aware Routing, Admission Control, Traffic Throttling, Traffic Shaping

INTERNETWORKING: How Networks Differ, How Networks Can Be Connected, Tunneling, Internetwork Routing, Fragmentation

THE NETWORK LAYER IN THE INTERNET: The IP Protocol, IP Addresses, IPv6

## **UNIT 4**

### **THE TRANSPORT LAYER**

THE TRANSPORT SERVICE: Services Provided to the Upper Layers, Transport Service Primitives

ELEMENTS OF TRANSPORT PROTOCOLS: Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Multiplexing, Crash Recovery

THE INTERNET TRANSPORT PROTOCOLS: UDP: Introduction to UDP, Remote Procedure Call, Real-Time Transport Protocols

THE INTERNET TRANSPORT PROTOCOLS: TCP: Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP



Connection Release, TCP Connection Management Modeling, TCP Sliding Window, TCP Timer Management

## **THE APPLICATION LAYER**

DNS—THE DOMAIN NAME SYSTEM: The DNS Name Space, Resource Records, Name Servers

ELECTRONIC MAIL: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery

## **NETWORK SECURITY:**

CRYPTOGRAPHY: Introduction to Cryptography, Substitution Ciphers, Transposition Ciphers, Two Fundamental Cryptographic Principles

SYMMETRIC-KEY ALGORITHMS: DES—The Data Encryption Standard, Cipher Modes

PUBLIC-KEY ALGORITHMS: RSA, Other Public-Key Algorithms

DIGITAL SIGNATURES: Symmetric-Key Signatures, Public-Key Signatures

MANAGEMENT OF PUBLIC KEYS: Certificates

## **Reference Books:**

1. Andrew S. Tanenbaum & David J. Wetherall : Computer Networks, 5th Edition, Prentice Hall, 2006.
2. William Stallings: Data & Computer Communications, 6th Edition, Pearson Education, 2002.
3. Larry L. Peterson & Bruce S. Davie: Computer Networks: 3rd Edition, Elsevier, 2003.
4. Behrouza Forouzan: Data Communication & Networking, 4th Edition, Mc Graw Hill, 2006.
5. Douglas E. Comer: Computer & Networks with Internet Applications, 4th Edition, Pearson Education, 2004

# **COMPUTER GRAPHICS**

## **UNIT 1**

Introduction, Video Display Devices, Refresh Cathode-Ray Tubes, Raster-Scan Display, Random-Scan Displays, Color CRT Monitors, Flat-Panel Displays, Raster Scan Systems, Input devices.

Output primitives: Points & Lines, Line Drawing Algorithms, Loading the Frame Buffer, Circle Generating Algorithms, Pixel Addressing and Object Geometry

## **UNIT 2**

Two dimensional transformations Basic & other transformations, Matrix representations, Homogeneous coordinates Composite transformations, General-pivot-point transformations.

Three Dimensional Transformations: Introduction to 3D Translation, Rotation & Scaling, Other Transformations, Modeling and Co-ordinate Transformations.

## **UNIT 3**

Three Dimensional Viewing :Viewing Pipeling, window to viewport transformations, Projections, Types of projections.

Graphical User Interface & Interactive Input Methods : The User Dialogue, Windows & Icons, feedback, Input of Graphical Data, Interactive Picture Construction Techniques, Basic Positioning Methods, Constraints, Grids, Gravity Field, Rubber-Band Methods, Dragging, Painting & Drawing

## **UNIT 4**

Curves & Surfaces: Properties, Bezier curves properties, Design techniques, Bezier surfaces, Displaying curves & surfaces

Hidden line removal algorithms

Introduction to fractals, Serpinsky's triangle, Construction, Koch curves.

Windowing & Clipping: Clipping operations, Line clipping algorithms, point clipping, text clipping, polygon clipping algorithms, Exterior clipping

**Text Book**

Donald D. Hern and M. Pauline Baker “Computer Graphics”, Pearson Education

**Reference:**

1. W. M. Newman and Robert Sproull” Principles of Interactive Computer Graphics” McGraw Hill 1989
2. Steven Harrington. “Computer Graphics a Programming Approach” McGraw Hill 1987
3. Roy A Plastock and Gardon Kelley.” Schaums outline of theory and problems of Computer Graphics” 2<sup>nd</sup> printing 1987, 1986 Edition
4. David F Frogers and J Alan Adams “ Procedural Elements of Computer Graphics” McGraw Hill 2<sup>nd</sup> edition 1990
5. James.D.Foley, A Vandam etal “Computer Graphics

# DATA STRUCTURES & ALGORITHMS

## UNIT I: Introduction

Introduction to Stages in Problem Solving, Difference between Data Type, Data Structure and Storage Structure, Formal Definition of Data Structure, Classification of Data Structure

**Analysis of Algorithms:** Algorithm, Time Complexity and Space Complexity, O-Notation, Omega Notation and Theta Notation.

**Primitive Data Structure:** Integer, Real, Character and Boolean and Its Storage Representation

## UNIT II: Non-Primitive Data Structures

**Arrays:** Introduction to Array Data Structure and Its Representation, Sparse Matrix Representation. Introduction to Structures

**Stacks:** Introduction, Implementation Using Arrays, Applications - Tower Of Hanoi, Expression Evaluation, Conversion of Expressions

## UNIT III: Stacks and Queues

**Queue:** Introduction, Types – Ordinary, Circular, Doubly Ended, Priority, Implementation Using Arrays

**Linked List:** Introduction, Types, Operations, Implementation of Stacks and Queues Using Linked List

## UNIT IV: Non-Linear Data Structures

**Graphs:** Introduction, Basic Terminologies, Graph Representation – Adjacency and Incidence Matrix Representation

**Trees:** Introduction, Binary Tree Representation – Array and Linked List Representations, Traversals – Preorder, In-order, Post order, Binary Search Tree, Introduction to B-Trees

**Hash Tables:** Direct Address Tables, Hash Tables, Hash Functions, Open and Closed Addressing

### References:

1. Andrew Tanenbaum: Data Structures and Algorithms, 2<sup>nd</sup> Edition, 2006
2. Trembley and Sorenson: “An Introduction to Data Structures, with Applications” McGraw Hill, Kongakusha 1976.
3. Horowitz and Sahni: “Data Structures” SBCS Publication, 1980.

# **ANALYSIS AND DESIGN OF ALGORITHMS**

## **UNIT 1**

**INTRODUCTION:** Algorithm specification, pseudo code conventions

**PERFORMANCE ANALYSIS:** Space Complexity, Time Complexity, Asymptotic Notation,

**Mathematical Analysis:** Recursive and Non recursive algorithms

**BRUTE FORCE –** Bubble Sort, Selection Sort, Sequential Search, String Matching

## **UNIT 2**

**DIVIDE- AND – CONQUER:** General Method, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort, Strassen’s Matrix Multiplication

**THE GREEDY METHOD:** The General Method, Knapsack Problem, Tree Vertex Splitting, 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.

## **UNIT 3**

**DYNAMIC PROGRAMMING:** The General Method, Binomial Coefficient, Multistage Graphs, All Pairs Shortest Paths Single-Source Shortest Paths: General Weights, String Editing, 0/1 Knapsack, the Traveling Salesperson Problem

**BACKTRACKING:** The General Method, the 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles

## **UNIT 4**

**Elementary Graph Problems:** Depth First Search, Breadth First Search, Topological Sort

**NP-Hard and NP-Complete Problems:** Basic Concepts, Nondeterministic Algorithms, The Classes NP-Hard And NP-Complete

**NP-Hard Graph Problems:** Clique Decision Problem (CDP), Node Cover Decision Problem, Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP), AND/OR Graph Decision Problem (AOG)

### **References:**

1. Analysis and Design of Algorithms: Horowitz Sahani
2. Analysis and Design of algorithms: Trembly
3. Introduction to Algorithms: Thomas H. Cormen

# **DATABASE MANAGEMENT SYSTEM**

## **UNIT 1**

Introduction and conceptual modeling databases and Database users, Data modeling using the entity relationship (ER) model, the enhanced entity – relationship (EER) model.

## **UNIT 2**

Relational model: Concepts constraints, Languages, Design and programming.

The relational data model and relational database constraints, Relational algebra and relational calculus, Introduction to SQL Programming technique

## **UNIT 3**

Database design theory and methodology functional dependencies and Normalization for relational database, Relational database design algorithms and further dependencies, practical database design methodology and use of UML diagrams.

## **UNIT 4**

Introduction to transaction processing concepts and theory recovery

### **TEXT BOOK:**

Fundamentals of database system – 5<sup>th</sup> Edition – Ramez elmasri, Navathe – Person edition

### **REFERENCE BOOKS:**

1. An introduction to database system – 8<sup>th</sup> Edition – C. J. Date, Kannan – Person Education
2. Database system concepts – 5<sup>th</sup> Edition – Korth, Sudarshan – McGraw Hill Edition

# **SOFTWARE ENGINEERING**

## **UNIT 1**

INTRODUCTION TO SOFTWARE ENGINEERING: Software and Software Engineering, phases in Software Development, Software Development Process models, Agile modeling, Introduction to metrics.

## **UNIT 2**

SOFTWARE REQUIREMENT SPECIFICATION: Role of SRS, Problem Analysis, Requirement specification, validation, metrics, Monitoring and control

PLANNING A SOFTWARE PROJECT: Cost Estimation, Project Scheduling, Staffing personal planning, Team Structure, Software Configuration Management, Quality Assurance Plans, Project Monitoring plans, Risk Management.

## **UNIT 3**

SYSTEM DESIGN: Design Objectives, design principles, Module level Concepts, Design methodology – object oriented approach Design Specification, Verification, Metrics, monitoring and control.

DETAILED DESIGN: Module Specification, Detailed design and process design Language, Verification

## **UNIT 4**

CODING: Programming practice, Verification, Metrics

TESTING: Testing Fundamentals, Fundamental testing, Structural Testing. Testing process  
Clean Room approach

### **Reference Books:**

1. Pankaj Jalote: “An Integrated approach to the Software Engineering” 2ed. Narosa Publishing House, New Delhi, 2002
2. Waman S Jawadekar: Software Engineering Principles & Practice - 3rd Edition  
Tata Mc Graw Hill Companies - 2006
3. Roger S Pressman: Software Engineering A Practitioner’s Approach - 6<sup>th</sup> Edition  
McGraw Hill - 2005
4. Sommerville: Software Engineering - 7<sup>th</sup> Edition : Pearson Education Ltd- 2006

# **THEORY OF LANGUAGES**

## **UNIT - 1**

**INTRODUCTION TO FINITE AUTOMATA:** Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata.

**FINITE AUTOMATA, REGULAR EXPRESSIONS:** An application of finite automata; Finite automata with Epsilon-transitions; Regular expressions; Finite Automata and Regular Expressions

## **UNIT - 2**

**REGULAR LANGUAGES, PROPERTIES OF REGULAR LANGUAGES:** Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Equivalence and minimization of automata.

**CONTEXT-FREE GRAMMARS AND LANGUAGES:** Context –free grammars; Parse trees; Ambiguity in grammars and Languages.

## **UNIT – 3**

**PUSHDOWN AUTOMATA:** Definition of the Pushdown automata; the languages of a PDA; Equivalence of PDA's and CFG's; Deterministic Pushdown Automata.

**PROPERTIES OF CONTEXT-FREE LANGUAGES:** Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFL

## **UNIT - 4**

**TURING MACHINE:** The turing machine; Extensions to the basic Turing Machines;

**UNDECIDABILITY:** A Language that is not recursively enumerable; An Undecidable problem that is RE; Post's Correspondence problem

## **REFERENCE BOOKS:**

1. **Introduction to Automata Theory, Languages and Computation** – John E.. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman., 3rd Edition, Pearson education, 2007.
2. **Fundamentals of the Theory of Computation: Principles and Practice** – Raymond Greenlaw, H.James Hoove, Morgan Kaufmann, 1998.
3. **Introduction to Languages and Automata Theory** – John C Martin, 3<sup>rd</sup> Edition, Tata McGraw-Hill, 2007.



# **OPERATING SYSTEM and UNIX**

## **UNIT 1**

Introduction to Operating System, Operating System Structures

Process Management: Processes, CPU Scheduling

## **UNIT 2**

Deadlocks, Storage Management: Memory management, Virtual Memory, File-System Interface

## **UNIT 3**

Introduction: Why UNIX? The Unix Environment, UNIX Structure, accessing UNIX, UNIX commands

File Systems: File Names, File Types, Regular Files, Directories, File System Implementation, Operations unique to directories, Operations unique to regular files, Operations common to both.

Vi editor, local commands, range commands in vi, global commands in vi, rearrange text in vi, ex editor.

## **UNIT 4**

Introduction to shells: Unix Session, Standard Streams, Redirection, pipes, tee command, command execution, command line editing, quotes, command substitution, job control, aliases, variables, predefined variables, options, shell/environment customization.

Security and file permission: User and groups, Security levels, changing permissions, User masks, Changing ownership and group, Regular expressions: Atoms, Operators, grep: operation, grep family, Searching for file content, sed and awk.

C Shell Programming: Basic script concepts, Expressions, Decision making selections,, Built in commands, Scripting techniques, Shell environment & Script, Script examples

## Reference Books:

1. Unix and Shell Programming, Behrouz A Forouzan and Richard F.Gilberg, 2<sup>nd</sup> Edition, 2003, Thomson.
2. System Programming and Operating Systems, Dhamdhare. D.M., 4<sup>th</sup> Edition, TataMcGraw Hill, 2006
3. A Practical Guide to Linux, Mark G. Sobell, 1<sup>st</sup> Edition, 2002, Pearson Education (Chapters:1 to 5, 8, 10, 11, 15)
4. UNIX: The Complete Reference, Kenneth Rosen and others, 2<sup>nd</sup> Edition, 2002,Osborne/McGraw Hill

## **SYSTEM SOFTWARE**

### **UNIT 1**

Background: Machine Structure, Evolution of the components of a programming system, evolution of operating system, operating system user view point functions, facilities

General Machine Structure, General Approach to a new machine, Machine Structure – 360 and 370, Assembly Language

### **UNIT 2**

Assemblers: General design procedure, design of an assembler.

Macro language and macro processor, macro instructions, features of macro, implementation

### **UNIT 3**

Loaders, different types of loaders, loader schemes, design of an absolute loader, design of direct linking loader.

Compilers: Structure and phases

### **UNIT 4**

Lex and yacc: The Simplest lex Program, Recognizing Words with Lex, Parser-Lexer

Communication, Regular Expressions, Grammars, Shift/Reduce Parsing, Structure of lex and yacc Programs, Programs in lex and yacc

### **References:**

1. Systems Programming by Donovan
2. Principles of Compiler design by Ullman
3. System programming by Dhamdhare
4. Lex and yacc by John R Levine, Tony Mason and Doug Brown

# **PRINCIPLES OF PROGRAMMING LANGUAGES AND 'C'**

## **UNIT 1: Preliminaries**

Reasons for studying concepts of programming languages, Programming domains, Language evaluation criteria, Implementation methods Names, Bindings, Type Checking, and Scopes Introduction, Names, Variables, The concept of Binding, Type Checking, String Checking, Type Compatibility, Scope, Scope and Lifetime, Referencing Environments, Named Constants, Variable Initialization.

## **UNIT 2: Data Types**

Introduction, Primitive Data types, Character String Types, User-Defined Ordinal Types, Array Types and Associative Arrays, Record Types, Union Types, Set Types, Pointers Types. Expression, Assignment Statements and Statement Level Control Structures Introduction, Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational And Boolean Expressions, Short-Circuit Evaluation, Assignment Statements, Mixed-Mode assignment.

## **UNIT 3**

Compound Statements, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands, Conclusion. Subprograms: Introduction, fundamentals, design issues, local referencing environments, parameter passing methods, overloaded programs, generic subprograms, coroutines, user defined overloaded operators

## **UNIT 4**

C LANGUAGE: C Fundamentals, Operation data input and output, Control statements, Function Storage classes, Arrays, Pointers, structures and unions, Enumeration, Command line parameters, Macros, 'C' processor.

### **Text Book:**

Robert W. Sebesta, Concepts of Programming Languages, Eight Edition, Pearson

# **INTERNET TECHNOLOGY**

## **UNIT 1**

Fundamentals: introduction to the Internet, WWW, Web Browsers, Web Servers, URL, Multipurpose Internet Mail Extensions (MIME), HTTP, Security, Introduction to HTML: Origins and Evolution, Basic Syntax, Document Structure, Basic tags, Images, Links, Lists, Tables, Forms, Frames.

## **UNIT 2**

Introduction to XML: Syntax of XML, XML Document Structure, Document Type Definition.

Introduction to XHTML: Origins and Evolution, Basic Syntax, Document Structure, Basic tags, Images, Links, Lists, Tables, Forms, Frames, Syntactic difference between HTML and XHTML.

Cascading Style Sheets (CSS): Introduction, levels of style sheets, Selector Forms, Property value forms, Font properties, Color, Alignment of Text, Box model, Background Images, <span> and <div> tags.

## **UNIT 3**

The basics of JavaScript: Overview, Object Orientation and JavaScript, General syntactic characteristics, Primitives, Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Objects, Arrays, Functions, Constructors, Errors.

JavaScript and XHTML Documents: Element access, Events and Event Handling, Handling Events from Body elements, Handling Events from Button elements, Handling Events from Text Box and password elements.

Dynamic Documents with JavaScript: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating Mouse Cursor, Reacting to Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements.

## **UNIT 4**

Introduction to PHP: Origins and Uses, Overview, General Syntactic Characteristics, Primitive, Operations and Expressions, Output, Control Statements, Arrays, Functions, Form Handling, Cookies.

**TEXT BOOK:**

Programming the World Wide Web – by Robert W. Sabesta 4<sup>th</sup> Edition Pearson Publications

**REFERENCE BOOKS:**

1. HTML and XHTML the Complete Reference.
2. How to program the World Wide Web – by Deitel and Deitel
3. Mastering in HTML – by Ray and Ray

# **JAVA Programming**

## **UNIT 1**

History and evolution of Java, An overview of Java, Data types, variables and arrays, Operators, Control statements- Introducing classes ,A closer look at methods and classes, Inheritance, Packages and interfaces.

## **UNIT 2**

Exception handling, Multithreaded Programming, Enumeration, Autotoxins, I/O, Applets

## **UNIT 3**

Networking, Event handling, Swings.

## **UNIT 4**

String handling, Collection framework, Introduction to J2EE, Java servlet, Java server pages (JSP) and HTML, JDBC objects.

### **TEXT BOOKS:**

1. The complete reference Java – 7<sup>th</sup> Edition – Herbert Schildt – Tata Mcgraw hill Edition.
2. The complete reference J2EE – Jem Keogh – Tata Mcgraw hill Edition.

### **REFERENCE BOOKS:**

1. The Complete Reference 7<sup>th</sup> Edition Herbert Schiidt
2. Head First Java – 2<sup>nd</sup> Edition

# **MULTIMEDIA**

## **UNIT 1**

Introduction to Multimedia (MM) Communication, Scope, Range, Feasibility and Challenges of MM Communication Key aspects of MM: Compression, Coding, Transmission and Replay.

## **UNIT 2**

Types of Compression: Quantization, Coding as PCM, DPCM, ADPCM. Simple Encoder and Decoders based on PCM Samples. Introduction to Transform domain Compression. Introduction to Audio part of MPEG, Psychoacoustics

## **UNIT 3**

Compression in Spatial Domain Algorithms for Data Compression in Transform Domain: DCT. Variable Length Coding, Huffman code. Variable Length Coding: Arithmetic Coding. Introduction to JPEG 2000 Standard, Encoders-Decoders based on this. Audio Compression and MPEG Audio

## **UNIT 4**

Fundamental concepts of Video. MPEG Architecture Details: Audio-Video- Systems. Video Coding standard related to H.263 and H. 264. MPEG- 1, 2 Video. MPEG- 4 : Video. Streaming and Transport Issues: Multiplexing, Synchronization and File formats. Errors in MPEG and Error handling, Concealment. Buffer structures and Buffer Management

Introduction to MPEG-7 and MPEG-21., HDTV. Content based Image Retrievals and Digital Libraries.

### **Reference Books:**

1. Ze-Nian Li and Mark Drew: Fundamentals of Multimedia, 2<sup>nd</sup> Ed, Pearson, 2005
2. Fred Halsall, Multimedia Communications., Pearson, 2005
3. Khalid Sayood, Introduction to Data Compression, 3<sup>rd</sup> Ed, Morgan Kaufman (India Ed), 2005
4. David Solomon, The DATA compression; The Complete Reference, 3<sup>rd</sup> Ed, Springer (India Ed), 2006



# **MICROCONTROLLERS**

## **UNIT 1**

Introduction, Numbering system and binary arithmetic,

## **UNIT 2**

The 8051 Architecture, Basic assembly language programming concepts, Moving data,

## **UNIT 3**

Logical operations, Arithmetic operations Jump and call instructions

## **UNIT 4**

An 8051 Microcontroller design, Applications

### **Reference books:**

1. Kenneth Ayala, "The 8051 Microcontroller", 3<sup>rd</sup> Edition, Thomson India edition, 2007.
2. Myke prick, "Programming and customizing the 8051 microcontroller", Tata McGraw-Hill edition, 2006.
3. Muhammad Ali Mazidi & Janice Gillispie Mazidi, "The 8051 Microcontroller and embedded systems", Pearson India, 2006.

# **DISCRETE MATHEMATICS**

## **UNIT 1**

Set Theory: Sets and Subsets. Operations on sets, Countable and uncountable sets, The addition principal, the concept of probability.

Mathematical Logic: Propositions, Logical Connectives, Tautologies; Contradictions, Logical equivalence, Application to switching networks, Duality, Commentates NAND and NOR, Converse, Inverse and Contrapositive, Rules of inference.

## **UNIT 2**

Open statements; Quantifiers, Logical Implication involving Quantifiers, Statements with more than one variable, Methods of proof and disproof, Mathematical Induction.

## **UNIT 3**

Relations and Ordering: Cartesian products of sets, Relations, Paths in relations and digraphs, Operations on relations, Composition of relations, Properties of relations, Equivalence relations, Partial orders, Total Orders, External elements in posets, Lattices.

Functions: Functions, Types of functions, Composition of function, Invertible functions, Permutation Function.

## **UNIT 4**

Fundamental principles of counting: Principles of inclusion and exclusion: The rule of sum and product, Permutations, combinations: The binomial theorem, combinations with repetition, Ramsey number, the Catalan numbers, sterling number and bell numbers, Generalizations of principles, the pigeonhole principle, Derangements-Nothing is in its Right place, Rook polynomials, Arrangements with Forbidden positions.

### **Text books:**

1. Discrete Mathematics by Dr. Chandrashekar S .
2. Discrete and combinational Mathematics by Ralph P. Grimaldi, 5th edition, Addison Wesley, 2004
3. Discrete mathematical structures by Kolman, Robert C Busby and Sharon., 6th Edition, Prentice Hall, 2008

# **SIMULATION & MODELLING**

## **UNIT 1**

Introduction, Simulation of prepursuit problem, A system & its model, Simulation of an inventory problem, The basic nature of simulation

Simulation of continuous systems: A chemical reactor, Numerical integration vs continuous system simulation, Selection of an integration formula, Runge Kutta integration formulas, simulation of a servo system, Simulation of a water reservoir system, Analog vs digital simulation

## **UNIT 2**

Discrete system simulation

Fixed time-step vs event to event model, On simulating randomness, Generation of random numbers, Generation of non uniformly distributed random numbers, Monte Carlo computation vs stochastic simulation

## **UNIT 3**

Simulation of queuing systems

Rudiments of queuing theory, simulation of single server queue, Simulation of two server queue, Simulation more general queues.

Simulation of PERT network

## **UNIT 4**

Network model of a project, Analysis of an activity network, Critical path computation, Uncertainties in activity duration, Simulation of an activity network, Computer program for simulation, Resource allocation and cost considerations, Inventory control & forecasting  
Elements of inventory theory, More complex inventory models, simulation examples, Generation of Poisson & erlang variates, Forecasting & regression analysis

Design and Evaluation of Simulation Experiments

Length of simulation runs, Variance reduction techniques, Experimental layout, validation

### **Reference:**

System Simulation with Digital Computer Narsingh Deo

# **OPERATIONS RESEARCH**

## **UNIT 1**

Introduction: formulation of LP problems, graphical solution of LP problems, General formulation of L P problems, Slack & Surplus variables, Standard form, Matrix form, Simplex method, Revised Simplex method, Dual simplex

## **UNIT 2**

Assignment model, Transportation model, Game theory

Probability: Introduction, Basic terms of probability, The Addition law of probability, discrete & continuous, variables, random variables, probability distribution of random variables, Mean variance& standard deviation, Mathematical expectation of a random variable.

## **UNIT 3**

Queuing theory

Introduction, queuing system, distribution, Kendall's Notation, Classification, model I (m/m/1).

## **UNIT 4**

Project management by PERT CPM

Introduction, history, Applications, Basic steps, Network diagram representation, rules of drawing network diagram, labeling Fulkerson's I-J rule, Time estimates & Critical path, PERT, Resource allocation, Uses of PERT/CPM.

### **References:**

1. Operations Research S D Sharma
2. Operations Research R K Gupta & D S Hira

# **MOBILE COMMUNICATION**

## **UNIT 1**

Introduction, Applications, History of wireless communication, reference model,  
Wireless transmission, Frequencies for radio transmission, signals, Antennas, Signal propagation  
Multiplexing, Modulation, Spread spectrum

## **UNIT 2**

Cellular Systems, Medium Access control, Motivation for a specialized MAC, SDMA, FDMA,  
TDMA, CDMA, Comparison.

## **UNIT 3**

Telecommunications Systems, GSM, DECT, TETRA, UMS & IMT 2000  
Satellite Systems, history, Applications, Basics, Classical TCP improvements, TCP over 2.5/3G  
wireless networks, performance enhancing proxies

## **UNIT 4**

Support for mobility, File Systems World Wide Web, Wireless Application protocol

**C++**

**Unit I**

Quick overview of C : Expressions - Statements - Arrays and Null-Terminated Strings –  
Pointers - Functions – Structures, Unions, Enumerations and User-Defined Types – C Style  
Console I/O – File I/O -.

**Unit II**

An Overview of C++ - Classes and Objects – Arrays, Pointers, References, and the Dynamic  
Allocation Operators

**Unit III**

Function Overriding, Copy Constructors and Default Arguments – Operator Overloading -  
Inheritance – Virtual Functions and Polymorphism

**Unit IV**

Templates – Exception Handling - The C++ I/O System Basics

**Text Book :**

Herbert Schildt : The Complete Reference C++, 4<sup>th</sup> Edition, Tata-McGraw-Hill, 2003

# **PATTERN RECOGNITION**

## **UNIT 1**

Machine perception, pattern recognition systems, Design Cycle, Learning and adaption, models of Pattern recognition

## **UNIT 2**

Bayesian Decision Theory

Introduction, Bayesian, Decision theory- Two category classification, classifiers-Two category case and multi category case, missing and noisy features.

## **UNIT 3**

Nonparametric Techniques

Introduction, Density estimation, Parzen window, KN neighbor estimation, The nearest neighbor rule, Metrics and Nearest Neighbor Classification, Error analysis of nearest decision rule

## **UNIT 4**

Introduction, Heirarchical clustering techniques, partitional clustering techniques Dimensionality reduction techniques Introduction, principle component analysis, Fisher Linear Discriminant Analysis, Spectral clustering based dimensionality reduction

### **References:**

1. R. O Duda, P.E. Hart and D G Stork, Pattern Classification, 2<sup>nd</sup> edition, Wiley publications
2. Earl Gose, Richard, Johnsonbaugh, Steve Jost, Pattern Recognition and Image Analysis, Prentice Hall of India, Pvt Ltd.
3. Cristopher M Bishop, Pattern Recognition and machine Learning

# **IMAGE PROCESSING**

## **UNIT I**

Introduction, digital image fundamentals

## **UNIT II**

Image enhancement in the spatial domain, Image enhancement in the frequency domain

## **UNIT III**

Image restoration, color image processing

## **UNIT IV**

Wavelets and multi-resolution processing image compression

### **Reference book:**

Digital Image Processing-Rafel C.Gonzalez and Richard E Words



# **SOFTWARE TESTING**

## **UNIT 1**

Assessing Testing Capabilities and Competencies, Building a software Testing Environment: Building a software Testing Strategy, Establishing a Software Testing Methodology, Determining your Software Testing Techniques, Selecting and Installing Software Testing Tools.

## **UNIT 2**

The Eleven-Step Testing Process: Eleven-Step Testing Process Overview, Step1: Access Project Management Development Estimate and status, Step2: Develop Test Plan, Step3: Requirement Phase Testing,

## **UNIT 3**

Step4: Design Phase Testing, step 5: Requirement Phase Testing, Step6: Execute Test and Record Results,

## **UNIT 4**

Step7: Acceptance Test Results Step8: Report Test Results, Step9: Testing Software Installing, Step10: Test Software Changes, Step11: Evaluate Test Effectiveness.

### **TEXT BOOK:**

Effective Methods for Software Testing, William E. Perry, 2<sup>nd</sup> Edition 2003, Wiley.

### **REFERENCE BOOKS:**

Rice, Randall and Peery, William E., *Surviving the Top Challenges of Software Testing*, New York: Dorset House, 1997.

# **GRAPH THEORY**

## **UNIT 1**

Introduction to Graph theory: Basic terminologies—direct & undirect graphs, walks, paths & circuits, sub-graphs and complements, Graph Isomorphism, vertex degree and regular graphs,

## **UNIT 2**

Konigsberg bridge problem & Euler graphs. Hamilton graphs & traveling salesman problem, planar graphs- definition & examples, Bipartite & Kuratowskis graphs, Euler's formula & detection of planarity, Dual of Planar graphs,

## **UNIT 3**

Graph Coloring: Proper coloring & chromatic number of graphs, Chromatic polynomial, four color problems, Trees: Optimization & Matching: Trees; Definition & Properties, Rooted & binary rooted trees, ordered trees & trees sorting. Weighted trees & prefix codes

## **UNIT 4**

Spanning trees, optimization, Networks, Cutset, Edge & Vertex connectivity of a graph, Max-flow Min-cut theorem and its applications, Matching theory and its applications

### **References:**

1. Graph Theory, V.K Balakrishnan, Schaum Series, McGrawHill, 1997
2. Graph Theory, by Frank Harary, Westview Press, 1994.

## **OOAD**

### **UNIT I**

Implementation of Object Oriented concepts using C++

### **UNIT II**

Introduction, Object orientation, OO development, OO themes, OO modeling ,History.  
Modeling, Abstraction, Models .Class Modeling Object & class, Link & Association concepts, Generalization & Inheritance, sample Class Model, Navigation of class models. Advanced class modeling: advanced object & class concepts, Association end N ary Association, Aggregation, Abstract Classes, Multiple Inheritance, Meta Data, Reification, Constraints, Derived Data.

### **UNIT III**

State modeling: Events, States, Transitions & Conditions, State Diagrams, State Diagram behavior. Advanced state modeling, interaction modeling.

### **UNIT IV**

System design: Overview of System design, Estimating performance, making a Reuse plan, Breaking a System into Subsystems, Identifying concurrency, Allocation of subsystems, Management of Data Storage.

### **Reference:**

Object Oriented Analysis and Design – Blaha, Rumbaugh

# **PROBABILITY AND STATISTICS**

## **UNIT 1**

Introduction, basic terminology, Interpretation of probability: Axioms of probability, Some elementary theorems, Conditional probability, Mathematical Expectation

## **UNIT 2**

Probability Distributions: Introduction, Discrete probability distributions continuous probability distributions, The expected value of a random variable Chebyshev's Theorem

## **UNIT 3**

Sampling distributions, Populations and samples, Sampling distribution, The sampling distribution of the mean, sampling distributions of proportions, sampling distributions of mean, chi squared distribution, F distribution.

## **UNIT 4**

Estimation and inference theory, introduction, point estimation, interval distribution, bayesian estimation, test of hypot, Introduction to ANOVA.

### **Reference Book:**

Probability and Statistics: Bheeshma Rao

# **DATA MINING**

## **UNIT 1**

Introduction, what kind of patterns can be mined? which technologies are used? which kind of applications are targeted?, major issues in Data mining.

Getting to know your data: Data objects and attribute types, basic statistical description of data, Data Visualisation, Measuring Data similarity and dissimilarity.

## **UNIT 2**

Data Preprocessing: data cleaning, Data integration, Data Reduction, Data transformation and Data Discretization

## **UNIT 3**

Mining frequent patterns, Associations and correlations: Basic concepts, Frequent mining methods, pattern Evaluation methods, Pattern mining in Multilevel multi dimensional space, Decision tree induction.

## **UNIT 4**

Cluster analysis, partitioning methods, heirarchical methods, density based methods, grid based methods, evaluation of clustering.

### **Reference:**

Data Mining: Concepts and Techniques, Third Edition, Jaiwei Han, Micheline Kamber, Jian Pei.

# **ARTIFICIAL INTELLIGENCE**

## **UNIT 1**

AI problems, AI techniques, defining the problem as state space search, production systems, problem characteristics

Heuristic Search: Generate and test, hill climbing, BFS, Problem Reduction, Constraint Satisfaction, Means-End Analysis

## **UNIT 2**

Knowledge Representation: Representations and mappings, approaches to knowledge representation

procedural v/s declarative knowledge, normal forms in predicate logic and clausal forms, non-monotonic reasoning

Declarative Representations: semantic nets, conceptual dependency, frames, scripts

## **UNIT 3**

Game playing: minimax search procedure, adding alpha-beta cut offs

Planning: An Example Domain – the blocks world, Components, goal stack planning

## **UNIT 4**

Expert systems: expert systems v/s conventional computers, expert system shells, explanation based learning.

Learning: Learning from observation - Inductive learning – Decision trees – Explanation based learning – Reinforcement Learning, Neural Networks, Introduction to Natural Language Processing.

### **Reference:**

Artificial Intelligence, Third Edition, Elaine Rich, Kevin Knight, Shivashankar B Nair,  
Tata McGraw-Hill

# **.NET TECHNOLOGIES**

## **Unit 1**

Benefits of .NET Framework, Architecture of .NET Framework 4.0, Components of .NET Framework 4.0: CLR, CTS, Metadata and Assemblies, .NET Framework Class Library, Windows Forms, ASP .NET.

Need of C#, C# Pre-processor Directives, Creating a Simple C# Console Application, Identifiers and Keywords. Data Types, Variables and Constants: Value Types, Reference Types, Type Conversions, Boxing and Unboxing, Variables and Constants. Expression and Operators: Operator Precedence, Using the :: (Scope Resolution) Operator and Using the *is* and *as* Operators. Control Flow statements: Selection Statements, Iteration Statements and Jump Statements.

## **Unit 2**

Arrays and Strings: One Dimensional and Multidimensional Arrays, Jagged Arrays  
Classes and Objects: Creating a Class, Creating an Object, Using this Keyword, Creating an Array of Objects, Using the Nested Classes, Defining Partial Classes and Method, Returning a Value from a Method and Describing Access Modifiers. Static Classes and Static Class Members. Properties: Read-only Property, Static Property, Accessibility of accessors and Anonymous types. Indexers, Structs: Syntax of a struct and Access Modifiers for structs. Strings: Constructing Strings, Operating on Strings, Arrays of Strings, The String Class

## **Unit 3**

Encapsulation: Encapsulation using accessors and mutators, Encapsulation using Properties.  
Inheritance: Inheritance and Constructors, Sealed Classes and Sealed Methods, Extension methods. Polymorphism: Compile time Polymorphism/Overloading, Runtime Polymorphism/Overriding. Abstraction: Abstract classes, Abstract methods. Interfaces: Syntax of Interfaces, Implementation of Interfaces and Inheritance.  
Delegates: Creating and using Delegates, Multicasting with Delegates. Events: Event Sources, Event Handlers, Events and Delegates, Multiple Event Handlers. Exception Handling: The try/catch/finally statement, Checked and Unchecked Statements.

## **Unit 4**

Introduction, Windows Forms, Life Cycle, Event Handling: A Simple Event- Driven GUI, Visual Studio Generated GUI Code, Delegates and Event- Handling Mechanism, Another Way to Create Event Handlers, Locating Event Information. Control Properties and Layout, Labels, TextBoxes and Buttons, GroupBoxes and Panels, CheckBoxes and RadioButtons, ToolTips, Mouse-Event Handling, Keyboard-Event Handling. Menus, MonthCalendar Control, ListBox Control, CheckedListBox Control, ComboBox Control, TreeView Control, ListView Control, TabControl Control ; Building an Multiple Document Interface (MDI) Application. Introduction to ADO.NET

### **References Books:**

1. Hebert Shildt: Programming in C# 4.0, Tata McGraw Hill.
2. C# with .net 4.0 by Andrew Troelsen
3. E Balaguruswamy Programming in C# , 3<sup>rd</sup> Edition.



# **OBJECT ORIENTED MODELING AND DESIGN WITH UML**

## **Unit I**

INTRODUCTION : Object-Oriented Analysis and Design - Iterative, Evolutionary, and Agile. -  
Case Studies : The NextGen POS System - INCEPTION : Inception is Not the Requirements  
Phase – Evolutionary Requirements - Use Cases – Other Requirements:NextGen Example

## **Unit II**

ELABORATION ITERATION 1: Basics – Domain Models – System Sequence Diagrams –  
Operation Contracts – Requirements to Design-Iteratively – Logical Architecture of UML  
Package Diagrams

## **Unit III**

On to Object Design – UML Interaction Diagrams – UML class Diagrams - GRASP : Designing  
Objects with Responsibilities – Object Design Example with GRASP:NextGen POS system –  
Designing for Visibility – Mapping Designs to Code

## **Unit IV**

ELABORATION ITERATION 2: UML Tools and UML as Blueprint – Quick Analysis Update:  
NextGen POS – Iteration 2: More Patterns – GRASP: More Objects with Responsibilities –  
applying GoF Design Patterns

### **TEXT BOOK:**

Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and  
Design and Iterative Development", Third Edition, Pearson Education, 2005

# **ANDROID APPLICATION DEVELOPMENT**

## **Unit 1**

Introduction to Android & Open Handset Alliance

Installation of Android Studio and other Development Environments like Gradle.

Understanding Android File System.

Creating First Android Application

Understanding Intent, Activity, Service, Content Providers, Broadcast Receivers.

Understanding Android Application, Manifests, Layouts, Drawables, Styles, Android Activity, View

Understanding Android XML based layout (Linear Layout, Relative Layout, Frame Layout).

Introduction to Android Life Cycle Events

initialization and Button Click Listeners.

## **Unit 2**

Development of Simple app containing Dialog Box, Intents, Toast, Spinners, Listeners examples.

Android ListView / GridView and Adapters

Android Date Picker Dialog, Time Picker Dialog

Launching sub Activity

Building Custom ListView and Understanding Adapters in detail

Understanding SQLite database. Populating database.

Developing simple app by using SQLite database (insert, delete, update)

## **Unit 3**

Working with web server basics

Background loading, AsyncTask, Using Threads

Developing simple app by downloading image from web and showing it in ImageView

Understanding Importance of External Libraries and demonstration of simple external library

Image lazy loading, Image loading in list view, grid view

## **Unit 4**

Working with Google Maps

ViewPager

Introduction to fragment, add, remove, replace fragment

ViewPager

Side Navigation Drawer

Action bar/ Toolbar

ViewPager Adapter / Swipe View

# **ADVANCED DATABASE MANAGEMENT SYSTEM**

## **Unit 1**

Disk storage, Basic file Structures and hashing, indexing structures for files.

Algorithms for query optimization.

## **Unit 2**

Physical database design and tuning, Introduction to transaction, Concurrency control techniques.

Concept for object databases, Object databases standard and design, database security.

## **Unit 3**

Enhanced datamodels for advanced applications, distributed databases and client server architectures, Emerging database technologies and applications.

## **Unit 4**

Definition of NoSQL, History of NoSQL and Different NoSQL products, NoSQL Basics. Exploring one among MongoDB/CouchDB/Cassandra along with Java/Ruby/Python interface : Interfacing and Interacting with NoSQL, NoSQL Storage Architecture, CRUD operations, Querying, Modifying and Managing NoSQL Datastores, Indexing and ordering datasets

Reference Book:

Fundamentals of Database System :5<sup>th</sup> Edition ,Navathe

# COMPILER DESIGN

## Unit-1

Introduction, Classification of grammars. Context free grammars. Deterministic finite state automata (DFA) Non-DFA.

Lexical analysis :Language processors; The structure of a Compiler; The evolution Of programming languages; The science of building a Compiler; Applications of compiler technology; Programming language basics. Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens.

## Unit-2

SyntaxAnalysis

Introduction; Context-free Grammars; Writing a Grammar. Top-down Parsing; Bottom-up Parsing.

Introduction to LR Parsing: Simple LR; More powerful LR parsers (excluding Efficient construction and compaction of parsing tables) ; Using ambiguous grammars; Parser Generators.

## Unit-3

Intermediate Code Generation

Variants of syntax trees; Three-address code; Translation of expressions; Control flow; Back patching; Switch-statements; Procedure calls.

Run-Time Environments

Storage Organization; Stack allocation of space; Access to non-local data on the stack; Heap management; Introduction to garbage collection.

## Unit-4

Code Generation

Issues in the design of Code Generator; The Target Language; Addresses in the target code; Basic blocks and Flow graphs; Optimization of basic blocks; A Simple Code Generator

Code optimization. Folding, redundant sub-expression evaluation. Optimization within iterative loops.

**Text book:**

Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman: Compilers Principles, Techniques and Tools, 2nd Edition, Addison-Wesley, 2007.

References: Tremblay, et. al, "The Theory and Practice of Compiler Writing". McGraw Hill, New York, 1985

## **OPEN ELECTIVES**

### **OP1: COMPUTER FUNDAMENTALS**

#### **UNIT 1**

##### **INTRODUCTION**

Computer, Characteristic of Computer, History of Computer, Components of Computer  
Key Factors of Computers: Hardware, Software - types of Software (Application and system), forms of software (firmware, shareware, freeware), Translator - Assembler, Compiler and Interpreters. Computer Application – Business, Scientific, Entertainment and educational.

##### **CLASSIFICATION OF COMPUTERS**

Mode of operations – Analog, Digital and hybrid Computers  
Size and capabilities – Micro, Mini, Main frame and Super computer

#### **UNIT 2**

##### **MEMORY UNITS**

Primary memory - RAM, ROM, PROM, EPROM, EEPROM, Flash memory  
Secondary memory – Magnetic disk (Hard disk, Zip disk, Jaz disk, Super disk)  
Optical disk (CD, CD – R, CD – RW, DVD), Magneto-optical disk device

##### **COMPUTER PERIPHERALS DEVICES AND INTERFACES**

Input devices – Working principle of Keyboard and mouse, Functional capabilities of Scanner, Digital Camera, OMR, OCR, touch pad, touch screen. Output Devices – Monitor, Printer, Plotter and projector.

Processors, Classification of Processors on speed, Motherboard, Power Supply, I/O Ports and its Maintenance

##### **PROGRAMMING LANGUAGES**

Machine, Assembly language and High Level Language

### **UNIT 3**

Introduction to Windows, Elements of Word Processing, Spread Sheet, Presentations .

Nudi/Baraha.

### **UNIT 4: INTERNET**

Basics of Internet: www, HTTP, DNS, IP address, Email, Web browsers, Search Engines

HTML: Introduction to HTML, CSS

E-Commerce: Introduction, Types, Advantages of e-commerce, Applications, survey on popular e-commerce sites

E-governance, Introduction to Cyber Ethics

### **TEXT BOOKS**

1. Digital Computer Fundamentals (6<sup>th</sup> Edition) – Thomas C. Bartee, Tata Mc Graw-Hill Edition.
2. Computer's Today – Suresh K Basandra.
3. Thomas C. Bartee, Digital Computer Fundamentals, (6<sup>th</sup> Edition) Tata Mc Graw-Hill Edition.
4. Morris Mano, Computer System Architecture (3<sup>rd</sup> Edition) PHI-2002. Chapters 3.3 & 3.4
5. Digital Principles and application (4<sup>th</sup> Edition) – Malvino Leach, Tata Mc Graw-Hill Edition
6. Computer System Architecture (3<sup>rd</sup> Edition) – Morris Mano, PHI