

MASTER OF COMPUTER APPLICATIONS (MCA) - COURSE STRUCTURE

(2012 Admission)

Semester I

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2101	Combinatorics & Graph Theory	50	50	4
CAS2102	Computer Organization	50	50	4
CAS2103	Programming in C	50	50	3
CAS2104	Discrete Mathematical Structures	50	50	3
CAS2105	Computer Based Optimization	50	50	3
CAS2106	Lab 1 + Viva-Voce	50	50	2
Total				19

Semester II

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2201	Computer Graphics	50	50	3
CAS2202	Data Structures using C	50	50	3
CAS2203	System Software	50	50	3
CAS2204	Applied Numerical Analysis	50	50	3
CAS2205	Elective 1	50	50	3
CAS2206	Lab 2 + Viva-Voce	50	50	2
Total				17

Semester III

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2301	Computer Algorithms	50	50	4
CAS2302	Data Base Management Systems	50	50	3
CAS2303	Object oriented Programming with C++	50	50	4
CAS2304	Software Engineering	50	50	3
CAS2305	Elective 1	50	50	3
CAS2306	Lab 3 + Viva-Voce	50	50	2
Total				19

Semester IV

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2401	Operating System	50	50	4
CAS2402	Artificial Intelligence	50	50	3
CAS2403	Elective 2	50	50	3
CAS2404	Elective 3	50	50	3
CAS2405	Mini Project Work	50	50	3
CAS2406	Lab 4 + Viva-Voce	50	50	2
Total				18

Semester V

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2501	Networks and Data Communications	50	50	4
CAS2502	Simulation and Modelling	50	50	3
CAS2503	Elective 1	50	50	3
CAS2504	Elective 2	50	50	3
CAS2505	Elective 3	50	50	3
CAS2506	Seminar	100	0	3
	Viva-voce (Internal)	100		
Total				19

Semester VI

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2601	Project Work and Viva-Voce	200	200	16
Total				16

Appendix 2

List of Electives

- E1 - Number Theory.
- E2 - Number Theory and Cryptography.
- E3 - Applied Probability and Statistics.
- E4 - Web Commerce Technologies.
- E5 - Object Oriented Design.
- E6 - Security in Computing.
- E7 - Embedded Systems II.
- E8 - Linux System Programming.
- E9 - Java Programming.
- E10 - Linux Internals.
- E11 - Compiler Design.
- E12 * - Advanced JAVA Programming
- E13 * - Advanced JAVA Mobile Programming
- E14* - Web enabled JAVA Programming.
- E15 - Data Mining.
- E16 - Software Project Management.
- E17 - Cryptography and Network Security.
- E18 - Intelligent Systems.
- E19 - Visual Programming VB.Net.
- E20 - Digital Image Processing.
- E21 - Software Quality.
- E22 – Android Application Programming
- E23 – Web Application Design using PHP
- E24 – Multimedia System Design
- E25 – Microprocessor Programming
- E26 – Embedded Systems II.

*Only one elective from E12, E13, and E14 can be selected for the entire course.

CAS 2101 COMBINATORICS AND GRAPH THEORY

UNIT 1

Selections and Binomial Coefficients: Permutation and Combination, Ordered Selections, Unordered Selections, Pairing Problems, Pairing within a set, Pairing between sets, An optimal assignment problem, Gale's optimal assignment problem, Recurrence relations, Generating functions, The inclusion-exclusion principle, Rook polynomials.

UNIT 2

Block designs and Error-correcting codes: Block designs, square block designs, Hadamard configurations, Error-correcting codes, Steiner systems and sphere packings, Steiner systems, Leech's lattice.

UNIT 3

Graphs and trees: Incidence and degree, Isomorphism, Subgraphs and union of graphs, Connectedness, Walks, Paths and circuits, Components, Connectedness Algorithm, Shortest path Algorithms, Eulerian graph, Hamiltonian graph- necessary and sufficient conditions, Traveling salesman problem, Bipartite graphs, Properties of trees, Centre of a tree, Rooted and binary trees, Spanning trees, Fundamental circuits, Spanning trees of a weighted graph, cutsets and cut-vertices, Fundamental cutsets, connectivity, separable graphs, Network flows, Max-flow Min-cut theorem

UNIT 4

Planar graphs, combinational and geometric duals, Kuratowski's graphs, Detection of planarity, thickness and crossings, Matrix representations of graphs, Incidence matrices, Adjacency matrices and their properties, Chromatic number, Chromatic polynomial, the five color theorem, the four problem.

UNIT 5

Directed graphs: Binary relations, directed graphs and Connectedness, Directed trees, Arborescence, Polish method, Tournaments, Counting labeled trees, Cayley's theorem, Counting methods, Polya Theory, Applications of graphs in Computer Science.

TEXT:

1.

Ian Anderson, **A First Course in Combinatorial Mathematics** Clarendon Press, Oxford, 1974

2.

Deo, N, **Graph Theory with Applications to Engineering and Computer Science**, Prentice-Hall Inc., 1974

REFERENCE:

1. Harry, F: Graph Theory, Addison Wesley Publ. Comp., 1972.
2. Trembley, J.P. and Manohar, R.P : Discrete Mathematical Structures with Applications to Computer Science, Mc-Graw Hill, 1975.
3. Krishnamurthy V, Combinatorics, Theory and Applications, West Press Pvt. Ltd 1985.
4. Doerr, A and Levasseur.K: Applied Discrete Structures of Computer Science, Galgotia Pub.Pvt.Ltd, 1986

Appendix I

CAS 2102 COMPUTER ORGANIZATION

(July 2012 Revision)

UNIT 1

Basic Structure of Computers – Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multicomputers.

Machine Instructions and programs – Numbers, Arithmetic Operations and Characters – Number representation, Memory locations and addresses, Memory operations, Addressing modes, Basic I/O operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions. Basics of Electronic Logic Gates and Flip-flops

UNIT 2

Input-Output organization – Accessing I/O devices, Interrupts, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces, PCI BUS, SCSI BUS, USB

The Memory System – Semiconductor RAM Memories, Read-Only Memories, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

UNIT 3

Arithmetic - Addition and Subtraction of signed numbers, Multiplication of positive numbers, Signed Operand Multiplication, Integer division, Floating point numbers and Operations.

Basic processing Unit – Fundamental Concepts, Execution of a complete instruction, Multiple-bus organization, Hardwired control, Microprogrammed control.

UNIT 4

Pipelining – Basic concepts, Data hazards, Instruction Hazards, Influence on instruction sets, Datapath and control consideration, superscalar operation, Performance consideration.

Embedded Systems – Processor chips for embedded applications, simple microcontroller, programming considerations, I/O device timing constraints, design issues.

UNIT 5

Computer Peripherals – Input Devices, Output devices, Serial Communication Links.

Large Computer Systems – Forms of parallel processing, Array Processors, Structure of General Purpose multiprocessors, Memory organization in Multiprocessors,

TEXT:

Computer Organization: Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 'Computer Organization'. 5th Ed. Tata McGraw-Hill, 2011.

REFERENCES:

1. Tanenbaum A.S , 'Structured Computer Organization'. 5/e, Prentice Hall of India 2006, (3rd 1990)
2. Mano, M M , 'Computer System Architecture'. 3rd Ed. Prentice Hall of India, 2007.
3. Hayes, 'Computer Architecture and Organization', 2nd Ed. McGraw Hill, 1998.

CAS 2103 PROGRAMMING IN C

(2008 Revision – Modified)

UNIT 1

Introduction - What is C, General Concepts, How C looks. C Character Set, Keywords
Data Types - Primary Data types, sizes. Identifiers, Variables – Declaration of variables,
initialization. Constants, Symbolic Constants.

UNIT 2

Storage Classes - Storage Class Specifiers, Scope Rules, Declaring variables using
storage classes. Operators - Arithmetic operators (Binary operator), Unary Operators,
Relational and Logical operators, Increment and Decrement operators, Bitwise operators,
Assignment operators and expressions. Conditional operator. Operator Precedence and
associativity. Data type Conversions – Implicit and Explicit Conversions. Control
Structures – Statement and Blocks- if else, else if, switch. Loops – while, for, do while.
Break and Continue. Go to and labels

UNIT 3

Functions – General concept of functions, Function returning non-integers, Call by value,
Call by reference, Recursive functions. Preprocessors - Concept of header files, File
inclusion, Macro substitution, Conditional inclusion. Arrays – General Concepts. One
dimensional Arrays, Array Declaration, initialization, Multi dimensional arrays.
Structures and Unions- Basics of Structures, Structures and Functions, Arrays of
Structures, Pointers to Structures, Self-Referential Structures. Table Lookup, Typedef,
Unions, Bit-fields.

UNIT 4

Introduction to Pointers- Pointers and Addresses, Pointers and Function Arguments,
Pointers and Arrays, Address Arithmetic, Character Pointers and Functions, Pointer
Arrays; Pointers to Pointers, Initialization of Pointer Arrays., Pointers vs.
Multidimensional Arrays. Command-line Arguments, Pointers to function, Complicated
Declarations

UNIT 5

Files -File Access, Error Handling-Stderr and Exit, Line input and output, Miscellaneous
Functions.

TEXT:

Kernighan, Brian W and Ritchie, Dennis M, 'The C Programming Language'. 2nd Ed.
Prentice Hall, 2007.

REFERENCES:

1. Les Hancock and Morris Krieger, 'The C Primer', McGraw-Hill, 1987
2. Yashavant Kanetkar, 'Let Us C', BPB Publication. 6th Ed. 2005
3. Byron Gottfried, 'Programming with C', 2nd Ed. Schaum's outline series,
2002.

CAS 2104 Discrete Mathematical Structures

(Revised July 2010)

Unit 1

Foundations: Sets, Logic and Algorithms – Sets, Mathematical Logic, Validity of Arguments. Quantifiers and First – Order Logic, Proof Techniques, Algorithms, Integers and Mathematical Induction, Linear Diophantine Equations, Relations, Equivalence relations, Equivalence Classes and Partitions, closures, Partially ordered sets, Lattices.

Unit 2

Matrices and Closures of Relations, Matrices, The Matrix of a Relation and Closures, Binary Operations, Counting Principles, Basic Counting Principle, Pigeon hole Principle, Permutations, Combinations, Generalized Permutations and Combinations.

Unit 3

Recurrence Relations. Sequences and Recurrence Relations, Linear Homogeneous Recurrence Relations. Linear Non homogeneous Recurrence Relations.

Unit 4

Boolean Algebra and Combinatorial Circuits. Two-element Boolean Algebra, Boolean Algebra, Logical Gates and Combinatorial Circuits, Karnaugh Maps and Minimization of Boolean Expressions.

Unit 5

Finite Automata and Languages – Finite Automata and Regular Languages, Deterministic Finite Automata, Pumping Lemma, Nondeterministic Finite Automata, Grammars and Languages.

Text:

Discrete Mathematics – Theory and Applications : D.S.Malik and M.K.Sen ; Cengage learning , 4th Indian reprint, 2009.

References:

1. Discrete and Combinatorial Mathematics – 5th edition, Ralph P.Grimaldi & B.V.Ramana, Pearson Edition, 2008
2. Discrete Mathematical Structures with Application to Computer Science : Trembley J.P. & Manohar R.P.: Mc.Graw Hill, 2007
3. Introduction to Automata Theory, Languages and Computation, John E.Hopcroft & Jeffry D.Ullman: Narosa Publishing House, 2008
4. Discrete Mathematics for Computer Scientists: 2nd edition John Truss, Pearson Education Limited 2001

CAS 2105 COMPUTER BASED OPTIMIZATION (Revised 2011)

UNIT 1

Linear Programming: Mathematical Model, Assumptions of Linear programming, Solutions of Linear Programming Problem - Graphical Method, Simplex Method – Artificial Variable Method, Two Phase Method, Big M Method, Applications, Duality, Dual Simplex Method, Introduction to Sensitivity Analysis.

UNIT 2

Special Types of Linear programming problems- Transportation Problem – Mathematical Formulation of Transportation Problem, Basic Feasible Solution in Transportation Problem, Degeneracy in Transportation Problem Initial Basic Feasible Solutions to Transportation Problem - Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Optimal Solution to Transportation Problem – MODI Method, Stepping Stone Method. Assignment problems: Definition, Hungarian Method for AP.

UNIT 3

Integer Programming: Pure Integer Programming Mixed Integer Programming, Solution Methods - Cutting Plane Method, Branch and Bound Method. Binary Integer Linear Programming, Travelling Salesman Problems – Iterative Method, Branch and Bound Method

UNIT 4

Dynamic programming: Deterministic and Probabilistic Dynamic programming, Linear Programming By Dynamic Programming Approach

UNIT 5

Queuing Model: Elements and Characteristics of Queuing System, Classification of Queuing System. Structures of basic Queuing Systems Definition and Classification of Stochastic Processes, Discrete- time Markov Chains, Continuous Markov Chains.

The classical Systems – Poisson Queuing System – $(M/M/1):(\infty/FIFO)$, $(M/M/1):(\infty/SIRO)$, $(M/M/1):(N/FIFO)$, Birth-death queuing systems, Pure Birth Queuing System, Pure Death Queuing System, $(M/M/C):(N/FIFO)$, $(M/M/C):(C/FIFO)$

REFERENCES:

1. J.K. Sharma, 'Operations Research' Theory and Applications, 4th Ed Mc Millan Publishing Company, 2009.
2. Taha, 'Operations Research', 8th Ed., Mc Millan Publishing Company, 2007.
3. Kanti Swaroop, P. K. Gupta, Man Mohan, 'Operations', 13th Ed, Sulthan Chand & sons, 2007
4. Beightler C. S & Philips D. T, 'Foundations of optimisation', 2nd Ed., Prentice Hall, 1979.
5. Mc Millan Claude Jr, 'Mathematical Programming', 2nd Ed. Wiley Series, 1979.
6. Srinath L.S, 'Linear Programming', East-West, New Delhi.
7. Gillet B G, 'Introduction to Operation Research: a computer oriented algorithmic approach', Mc Graw Hill Book Comp. 1976.

CAS 2201 COMPUTER GRAPHICS

UNIT I

Overview of Graphics Systems: Video display devices, Raster Scan Systems, Random Scan Systems, Graphics Software. Output Primitives: Points and Lines, Line-Drawing Algorithms, Circle-generating algorithms, Ellipse generating algorithms, Filled-Area primitives, character generation.

Attributes of output primitives: Line, curve, area-fill, Character and bundled attributes, Antialiasing

UNIT 2

Two Dimensional Geometric Transformations: Basic transformations, Matrix representation and Homogeneous coordinates, Composite transformations, Other transformations, Transformations between coordinate systems, Affine transformations, Raster methods for transformations. Two-dimensional Viewing: The viewing pipeline viewing coordinate reference frame, window-to-viewport coordinate transformation, Clipping operations, Line clipping, polygon clipping, curve, text and exterior clipping.

UNIT 3

Structures and hierarchical modeling: Basic modeling concepts, Hierarchical modeling with structures. Graphical User interfaces and interactive input methods: Input of graphical data, Input functions, interactive picture-construction techniques. Three Dimensional Concepts and object representations: Three-dimensional display methods, Spline Representations, Bezier curves and surfaces, Sweep representations, Constructive solid-geometry methods, Octrees, BSP trees, Fractal-Geometry methods: Fractal-Generation Procedures, Classification of Fractals, Fractal dimension, Geometric construction of Deterministic Self-similar fractals, Affine Fractal-Construction Methods, Random Midpoint-Displacement Methods, Shape Grammars and other procedural methods. Physically based modeling, Visualization of data sets.

UNIT 4

Three –Dimensional Geometric and modeling transformations and viewing: Translation, Rotation, Scaling, Other transformations, Composite Transformations, Modeling and coordinate transformations, Viewing Pipeline, Viewing Coordinates, Projections, Viewing volumes and general projection transformations, Clipping
Visible Surface-detection methods: Classification, Back-face detection, a buffer method, scan-line method, Depth-sorting method, BSP tree method, area-subdivision method. Wire frame methods.

UNIT 5

Illumination models and surface-rendering methods: Light sources, basic illumination models, Polygon-Rendering methods, Ray-tracing methods, Computer Animation: Design of Animation Sequence, Raster animations, Key-frame systems – Morphing, Motion specifications.

TEXT: Hearn, Donald and Baker, M Pauline, 'Computer Graphics'. 2nd Ed., Pearson Education, 2002.

REFERENCES:

1. Foley, James D et.al., 'Introduction to Computer Graphics', Addison Wesley, 1994.
2. Newmann, William M & Sproull, Robert F, 'Principles of Interactive Computer Graphics', Mc Graw Hill, 1981.

CAS 2202 DATA STRUCTURES USING C

UNIT 1

Arrays. Lists, Stacks, Queues, applications of queues-simulation, implementation details.

UNIT 2

Trees-Ordered trees, Binary search tree, AVL tree. RED BLACK tree. Threaded binary trees- inorder, postorder and preorder – traversal, insertion and deletion.

UNIT 3

Heap-Binomial Heap, Fibonacci Heap, Hash functions.

UNIT 4

Recursion - Backtracking - Removal of recursion – Examples

UNIT 5

Sorting algorithms – Quick sort, Radix sort, Heap sort, Merge sort and Count sort

TEXT :

Horowitz E and Sahni S, 'Fundamentals of data structures', Computer Science press, 1978.

REFERENCES:

1. Wirth,Niclaus, 'Algorithms + Data structures = Programs', Prentice Hall International, 1976.
2. Knuth D, 'The Art of Computer Programming Vols.1 & 2', Addison - Wesley, 1970-80.
3. Tanenbaum, A.M and Augenstein, M J, 'Data Structures with Pascal', Prentice Hall International, 1985.

CAS 2203 SYSTEM SOFTWARE

UNIT I

Assemblers:- Basic Assembler Functions, Machine-Dependent Assembler Features, Machine-Independent Assembler Features, Assembler Design Options, Implementation Examples

UNIT 2

Loaders and Linkers: - Basic Loader Functions, Machine-Dependent Loader Features, Machine-Independent Loader Features. Loader Design Options, Implementation Examples, MS-DOS Linker.

UNIT 3

Macro Processors: - Basic Macro Processor Functions, Machine-Independent Macro Processor Features, Macro Processor Design Options, Implementation Examples.

UNIT 4

Compilers: - Basic Compiler Functions, Machine-Dependent Compiler Features, Machine-Independent Compiler Features, Compiler Design Options, Implementation Examples.

UNIT 5

Operating systems:- Basic Operating System Functions. Machine-Dependent Operating System features, Machine-independent Operating System features. Operating System Design Options, Implementation Examples.

Text:

Leland L.Beck: “**System Software An introduction to System Programming**” 3 rd Edition; Addison Wesley 1997.

REFERENCES:

1. Donovan J. J: Systems Programming Mc Graw Hill, 1972
2. Dhamdhare D.M : Introduction to System Software. Tata Mc Graw Hill Pub. Co., 1986
3. Johes.Robin and Stewart: The art of Programming Narosa Pub. House. New Delhi
4. Cooper. Mullish: The spirit of C. Introduction to Modern Programming. Jaico Publ. House, New Delhi 1987
5. Kenneth A: C Problem Solving and Programming Prentice Hall International.
6. Kernighan. B.W. and Ritchie D.M.: The C Programming Language Prentice Hall India
7. Schildt.H: C made Easy. Mc Graw Hill Book Co.1987.
8. Kaicker. S Programming with C Mc Millan India

CAS 2204 APPLIED NUMERICAL ANALYSIS

UNIT I

Solving Nonlinear Equations:- Improved Ideal Gas Laws, Interval Halving (Bisection) Revisited. Linear Interpolation Methods. Newton's Method, Muller's Method. Fixed-Point Iteration. Newton's Method for Polynomials, Bairstow's Method for Quadratic Factors. Multiple Roots.

UNIT 2

Solving Sets of Equations: Computing the forces in a Planar Truss, Matrix Notation. The Elimination Method. Gauss and Gauss-Jordan methods, Pathology in Linear Systems-Singular Matrices. Determinants and Matrix Inversion, Norms. Condition numbers and Errors in Solutions. Iterative Methods. The relaxation Method. Systems of Nonlinear equations.

UNIT 3

Interpolation and Curve Fitting: An Interpolation Problem. Lagrangian Polynomials. Divided Differences, Evenly Spaced Data. Interpolating with a cubic Spline, Bezier curves Polynomials Approximation of surfaces, Least-Squares Approximations.

UNIT 4

Numerical Differentiation and Numerical Integration: and B-Spline Curves, Getting Derivatives and Integrals Numerically, Derivatives from Difference Tables, Higher – Order Derivatives, Extrapolation Techniques, Newton-Cotes Integration formula. The Trapezoidal Rule-A Composite Formula. Simpson's Rules, Gaussian Quadrature, Adaptive Integration, Multiple Integrals, Multiple Integration with Variable Limits.

UNIT 5

Numerical Solution of Ordinary Differential equations: The spring-Mass Problem. A variation. The Taylor-Series Method. Euler and modified Euler Methods. Runge-Kutta Methods. Multistep Methods. Milne's Method. The Adams-Moulton Method, Multivalued Methods. Convergence Criteria, Errors and error Propagation Systems of Equations and Higher –Order Equations, Comparisons of Methods/Stiff Equations.

Assignment may be given to develop programs in FORTRAN for the various numerical methods

TEXT: Gerald, Curtis F, Whealey, Patrick O, 'Applied Numerical Analysis', 5th Ed. Addison – Wesley, 1994.

REFERENCES:

1. Stoer, Bullrich, 'Computer Oriented Numerical Methods', Springer Verlag, 1980
2. Krishnamurthy, E.V & Sen S.K, 'Computer Based Numerical Algorithms', East West Press, 1984
3. Alfi A A, 'Statistical Analysis: A Computer Oriented approach', Academic Press, Inc, 1979
4. Scalzo F, 'Elementary Computer Assisted Statistics', Van Nostrand reinherd Co. Limited, 1978
5. Rajaraman V, 'Computer Oriented Numerical Methods', Prentice Hall India, 1980

CAS 2301 COMPUTER ALGORITHMS

UNIT I

Growth of functions, Asymptotic notations, Standard notations & common functions, Summations, Recurrences, The efficiency of Algorithms, Analysis of Algorithms Elementary Data Structures – Hash tables, Binary search trees – AVL tree, Red-black tree, B-Trees, Augmenting Data Structures, Binomial heaps, Fibonacci Heaps, Data Structures for disjoint sets.

UNIT 2

Dynamic Programming techniques – Principle of Optimality, Matrix – Chain multiplication, Knapsack Problem. Greedy Algorithms – An activity selection problem, Huffman codes, A task scheduling problem. Divide & Conquer Strategy-Closest pair of points, Back tracking algorithms.

UNIT 3

Graph Algorithms – BFS, DFS, Topological sort, strongly connected components, Flow networks, Branch & Bound Algorithms

UNIT 4

Number Theoretic Algorithms – Matrix multiplication, Inverting matrices, Primality testing, Integer factorization

UNIT 5

Computational Complexity – sorting, The complexity of sorting, NP completeness

TEXT: Cormen, Thomas H, Leiserson, Charles E & Rivest, Ronald L, ‘Introduction to Algorithms’, Prentice Hall of India Private Limited, New Delhi, 1998.

REFERENCES:

1. Sahni, ‘Data Structures, Algorithms and Applications in C++’, Tata Mc-Graw Hill, 1998
2. Gilles Brassard & Paul Bratley, ‘Fundamentals of Algorithms, Prentice-Hall of India Private Limited
3. Goodman, S E & Hedetniemi, ‘Introduction to the Design & analysis of Algorithms’, Mc-Graw Hill Book Co., 1977
4. Horowitz E., Sahni, S, ‘Computer Algorithms’, Galgotia Publications Pvt. Ltd.
5. Aho, A.V, Ullman, J D. & Hopcroft, J E, ‘The Design & Analysis of Computer Algorithms’, Addison Wesley
6. Mark Allen Weiss, ‘Data Structures & Algorithm Analysis in C++’, Addison Wesley
7. Knuth, D.E, ‘Fundamentals of Algorithms’, Addison Wesley

CAS 2302 DATABASE MANAGEMENT SYSTEMS

(Revised June 2009)

Unit 1: Introduction

Introduction to File and Database systems- History- Advantages, disadvantages- Data views – Database Languages – DBA – Database Architecture – Data Models – Keys – Mapping Cardinalities

Unit 2: Relational Model

Relational Algebra and calculus – Query languages – SQL – Data definition – Queries in SQL – Updates – Views – Integrity and Security – triggers, cursor, functions, procedure – Embedded SQL – overview of QUEL, QBE

Unit 3: Database Design

Design Phases – Pitfalls in Design – Attribute types –ER diagram – Database Design for Banking Enterprise – Functional Dependence – Normalization (1NF, 2NF, 3NF, BCNF, 4NF, 5NF).

File Organization – Organization of Records in files – Indexing and Hashing.

Unit 4: Transaction Management

Transaction concept – state- Serializability – Recoverability- Concurrency Control – Locks- Two Phase locking – Deadlock handling – Transaction Management in Multidatabases

Unit 5: Current Trends

Object-Oriented Databases- OODBMS- rules – ORDBMS- Complex Data types – Distributed databases – characteristics, advantages, disadvantages, rules- Homogenous and Heterogenous- Distributed data Storage – XML – Structure of XML Data – XML Document- Data mining- Data warehousing- Applications and Challenges in Multimedia databases- Overview of Biological databases- Mobile databases.

Text: Abraham Silberschatz, Henry F. Korth and A Sudarshan, ‘**Database System Concepts**’. 5th Ed., McGraw Hill International Edition, 2006

References:

1. Philip J. Pratt, Joseph J Adamski, ‘**Database Management Systems**’, Cengage Learning, 2009
2. Rameez Elmasri, Shamkant B. Navathe, ‘**Fundamentals of Dtabase Sytems**’, 5th Ed., Pearson Education, 2009
3. Arun K Majumdar, Pritimoy Bhattacharyya, ‘**Database Management Systems**’, TMH, 2009
4. ISRD group, ‘**Introduction to Database Management Systems**’, TMH, 2008
5. Raghu Ramakrishnan, Johannes Gehrke ‘**Database Management Systems**’, McGraw Hill International Eition, 2003
6. Ramon A Mata-Toledo, Pauline K Cushman, ‘**Database Management Systems**’, TMH, 2008

CAS 2303 OBJECT-ORIENTED PROGRAMMING WITH C++

(June 2008 Revision)

UNIT I

Introduction to Object oriented paradigm, Basic concepts of Object oriented programming, Applications of OOP. Introduction to C++ - I/O Streams, Datatypes and declarations, Operators, Arrays, Strings, Control flow, Storage classes and linking, File streams, Pointers, Reference variables, Functions, Inline functions, Default arguments, Function Overloading.

UNIT 2

Classes and objects, Static members and functions, Const objects and Const member Functions, Friend functions, Object initialization and cleanup-Constructors, Different types of constructors, Destructors, Container classes.

UNIT 3

Dynamic Object creation-new and delete Operators, this pointer, Operator overloading. Inheritance - Different types of inheritance, Abstract classes, Inheritance versus Composition.

UNIT 4

Polymorphism and virtual functions, Pure virtual functions, Abstract classes, Dynamic binding, Casting, Object slicing.

UNIT 5

Templates-Function Templates, Class templates, Overloading of templates, Exception handling, Namespace.

TEXT:

1. Mastering C++, Venugopal, 1999 Edition, Tata Mc Graw Hill

REFERENCES:

1. The C++ programming language, Bjarne Stroustrup, 2000 Edition, Pearson
2. Herbert Scheldt, The Complete Reference C++ – 2003 Edition, Tata Mc Graw Hill
3. Object Oriented Programming in C++, Robert Lafore, 2000 Edition,
GALGOTIA

CAS 2304 SOFTWARE ENGINEERING (Revised 2011)

Unit 1

Software and Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice. Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models.

Unit 2

Understanding Requirements: Requirements Engineering, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Validating Requirements. Requirements Modeling: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class – Based Modeling.

Unit 3

Requirements Modeling: Requirements Modeling Strategies, Flow-Oriented Modeling. Design Concepts: Design Within the Context of Software Engineering, The Design Process, Design Concepts. Architectural Design: Software Architecture - What is Architecture?, Why is Architecture Important? Architectural Styles, Architectural Design.

Unit 4

Component-Level Design: What is a Component?, Designing Class-Based Components. User Interface Design: The Golden Rules, User Interface Analysis and Design. Software Configuration Management, The SCM Repository, The SCM Process.

Unit 5

Software Testing: A Strategic Approach to Software Testing, Testing Conventional Applications - Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Emerging trends in Software Engineering - Future Technology Directions

Text Book:

Software Engineering – Roger S Pressman, ‘Software Engineering: A Practitioner’s Approach, 7 th Edition, McGraw-Hill International Edition, 2010.

References:

1. Richard Fairey, ‘Software Engineering concepts, Tata McGraw-Hill 2009 reprint
2. Ian Sommerville, ‘Software Engineering’. 6th Ed., Addison Wesley
3. Waman S Jawadekar, ‘Software Engineering Principles and Practice’, Tata McGraw Hill, 2004

CAS 2304 -Operating System

(Revised July 2009)

Unit 1:

Operating System Basics, Computer System Structures: Computer System Operations, I/O Structure, Storage Structure, Storage hierarchy, Hardware Protection, Network Structure, **Operating System Structures:** System Components, OS Services , System Calls, System Programs, System Structure, **Process:** Process concepts, Process scheduling, Operation on processes, IPC, Communication in client-server system, **Threads:** Overview, Multithreading models, Threading issues, Pthreads.

Unit 2:

CPU Scheduling: Basic concepts, Scheduling criteria, scheduling algorithms, Multiple processor scheduling, Real time scheduling, Algorithm evaluation, **Process Synchronization:** Critical section problems, Synchronization hardware, Semaphore, Classic problems of synchronization, Critical regions, Monitors, Atomic transaction, **Deadlocks:** system model, Deadlock characterization, Methods of handling deadlocks, Deadlock prevention, deadlock avoidance, Deadlock detection, Recovery from deadlock.

Unit 3:

Memory Management: Background, swapping, contiguous memory allocation, Paging, Segmentation, Segmentation with paging. **Virtual Memory:** Background, Demand Paging, Process Creation, Page replacement, Allocation of frames, Thrashing, **File System Interface and Implementation:** File Concept, Access Methods, Directory Structure, File-system Mounting, File Sharing, Protection, File-System Structure, File-System Implementation, Directory Implementation, Allocation methods, Free-space Management, Efficiency and Performance, Recovery, Log-Structured File System, NFS.

Unit 4:

I/O Systems: Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O to Hardware Operations, Streams, Performance. **Mass Storage Structure:** Disk structure, Disk Scheduling, Disk Management, Swap-space Management, RAID structure, Disk Attachment, Stable-Storage Implementation, Tertiary-storage structure. **Distributed System Structure:** Background, Topology, Network types, Communication, Communication protocols, Robustness, Design Issues.

Unit 5:

Protection: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Evocation of Access rights, Capability-Based system, Language-Based Protection. **Security:** The Security Problem, User Authentication, Program Threats, System Threats, Securing Systems and Facilities, Intrusion Detection, Cryptography, Computer-Security Classifications, **Case Study:** The Linux System.

Text book: Operating System Concepts: Silberschatz, Galvin, Gagne 6th edition, wiley India, 2003

References:

1. Introduction to Operating System: Andrew Tanenbaum, 3rd edition , Pearson ,2006
2. Operating Systems: Internals and Design Principles; fifth edition: Williams Stallings, 5th edition , Pearson, 2006

CAS 2304 -Operating System

(Revised July 2009)

Unit 1:

Operating System Basics, Computer System Structures: Computer System Operations, I/O Structure, Storage Structure, Storage hierarchy, Hardware Protection, Network Structure, **Operating System Structures:** System Components, OS Services , System Calls, System Programs, System Structure, **Process:** Process concepts, Process scheduling, Operation on processes, IPC, Communication in client-server system, **Threads:** Overview, Multithreading models, Threading issues, Pthreads.

Unit 2:

CPU Scheduling: Basic concepts, Scheduling criteria, scheduling algorithms, Multiple processor scheduling, Real time scheduling, Algorithm evaluation, **Process Synchronization:** Critical section problems, Synchronization hardware, Semaphore, Classic problems of synchronization, Critical regions, Monitors, Atomic transaction, **Deadlocks:** system model, Deadlock characterization, Methods of handling deadlocks, Deadlock prevention, deadlock avoidance, Deadlock detection, Recovery from deadlock.

Unit 3:

Memory Management: Background, swapping, contiguous memory allocation, Paging, Segmentation, Segmentation with paging. **Virtual Memory:** Background, Demand Paging, Process Creation, Page replacement, Allocation of frames, Thrashing, **File System Interface and Implementation:** File Concept, Access Methods, Directory Structure, File-system Mounting, File Sharing, Protection, File-System Structure, File-System Implementation, Directory Implementation, Allocation methods, Free-space Management, Efficiency and Performance, Recovery, Log-Structured File System, NFS.

Unit 4:

I/O Systems: Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O to Hardware Operations, Streams, Performance. **Mass Storage Structure:** Disk structure, Disk Scheduling, Disk Management, Swap-space Management, RAID structure, Disk Attachment, Stable-Storage Implementation, Tertiary-storage structure. **Distributed System Structure:** Background, Topology, Network types, Communication, Communication protocols, Robustness, Design Issues.

Unit 5:

Protection: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Evocation of Access rights, Capability-Based system, Language-Based Protection. **Security:** The Security Problem, User Authentication, Program Threats, System Threats, Securing Systems and Facilities, Intrusion Detection, Cryptography, Computer-Security Classifications, **Case Study:** The Linux System.

Text book: Operating System Concepts: Silberschatz, Galvin, Gagne 6th edition, wiley India, 2003

References:

1. Introduction to Operating System: Andrew Tanenbaum, 3rd edition , Pearson ,2006
2. Operating Systems: Internals and Design Principles; fifth edition: Williams Stallings, 5th edition , Pearson, 2006

CAS 2402 ARTIFICIAL INTELLIGENCE

(Revised – July-2010)

UNIT 1

What is AI, History of AI, Intelligent Agents – Agents and environments – Good behavior – The nature of environments – Structure of agents – Problem Solving – Problem solving agents – Example problems – Searching for solutions – Uniformed search strategies – Avoiding repeated states – Searching with partial information.

UNIT 2

Informed Search Strategies – Heuristic function – Local search algorithms and optimisation problems – Local search in continuous spaces – Online search agents and unknown environments – Constraint satisfaction problems (CSP) – Backtracking search and Local search – Structure of problems – Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – Games that include an element of chance.

UNIT 3

Logical Agents, Reasoning pattern in propositional logic, Effective propositional inference, Agents based on Propositional Logic First Order Logic – syntax and semantics – Using first order logic – Knowledge engineering Inference – Prepositional versus first order logic – Unification and lifting – Forward chaining – Backward chaining – Resolution

UNIT 4

Knowledge representation – Ontological Engineering – Categories and objects – Actions – Simulation and events – Mental events and mental objects. Planning: The planning problem – Planning with state space search – Partial order planning Planning graphs – Planning with propositional logic

UNIT 5

Learning From Observations – forms of learning – Inductive learning – Learning decision trees – Ensemble learning

Text Book:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education, 2004.

References:

1. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Third Edition, Tata McGraw Hill, 2009.

CAS 2501 NETWORK AND DATA COMMUNICATIONS

(Revised July 2010)

Unit 1

Introduction: - Uses of Computer Networks, Network Hardware, Network Software, Reference Models, Example Networks, Network Standardization, The **Physical Layer:** The Theoretical Basis For Data Communication, Guided Transmission Media, Wireless Transmission, Communication Satellites, Public Switched Telephone Network, The Mobile Telephone System.

Unit 2

The Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, Example Data Link Protocols. **The Medium Access Sub layer:** The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANS, Broadband Wireless, Bluetooth, Data Link Layer Switching.

Unit 3

The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality Of Service, Internetworking, The Network Layer in the Internet.

Unit 4

The Transport Layer: The Transport Service, Elements of Transport Protocols, A Simple Transport Protocol, The Internet Transport Protocols (TCP & UDP).

Unit 5

The Application Layer: DNS – Domain Name System, Electronic Mail, The World Wide Web, Multimedia. Network Security: Cryptography, Symmetric-Key Algorithms, Public-Key Algorithms, Social Issues.

Text:

Andrew S Tanenbaum , Computer Networks, Fourth Edition, Pearson Education 2003.

References :

1. Black, Data Networks: concepts theory and practices, PHI,1988.
2. Corner, Internetworking with TCPP/IP, Principles, protocols and architecture, PHI (Paperback Edition).
3. William Stallings, Data and Computer Communication, 6th Edition, PHI 2000.
4. Data Communications and Networking, Fourth Edition, 2008 Behrouz A Forouzan.

CAS 2502 SIMULATION AND MODELLING

UNIT I

Basics of Simulation Modeling – The Nature of Simulation Systems, System – environment – components, Models and Simulation, Discrete event Simulation, Other Types of Simulation – Continuous Simulation. Combined Discrete – Continuous Simulation – Examples, Monte Carlo Simulation, Advantages and Disadvantages of Simulation – Area of application.

UNIT 2

Modeling Complex Systems – List processing in Simulation, Simulation language – Simblib. Simulation Softwares – Comparison of Simulation Packages with Programming Languages, Classification of Simulation Softwares, Desirable Software Features, General features of GPSS, SIMSCRIPT and SIMULA.

UNIT 3

Random Number Generation: Properties of Random Numbers – Generation of Random Numbers, Tests for Random Numbers, Random Variate Generation – Inverse Transforms Technique – Exponential and Uniform /distributions.

UNIT 4

Statistical Models in Simulation – Review of Terminology and Concepts – Useful Statistical Models – Queuing Models Characteristics of Queuing Systems, Simulation of a Single Server Queue.

UNIT 5

Input Modeling: Data Collection – Identifying the Distribution with Data, Verification and Validation of Simulation Models, Model Building.
Output Analysis for a Single System – Stochastic Nature of Output Data, Types of Simulation with respect to Output Analysis for Terminating Simulations.

TEXTBOOKS:

1. Averill M.Law and W.David Kelton, '**Simulation Modeling and Analysis**', Tata Mc Graw Hill - 3rd Edn. 2003.
2. Jerry Banks, John S.Carson and Barry L.Nelson, '**Discrete-Event System Simulation**', Prentice Hall, 2nd Edn. 1995.

REFERENCES:

1. Narsingh Deo, '**System Simulation with Digital Computer**', PHI 1998.
2. G.Gordan, '**System Simulation**', Prentice Hall.

E1 - NUMBER THEORY

UNIT I

Unique Factorization: Unique Factorization in \mathbb{Z} , Infinitely many primes in \mathbb{Z} , $\sum(1/p)$ Diverges, The growth of $\pi(x)$ Congruence: properties, complete and reduced residue systems, Fermat's theorem. Euler function, The Chinese Remainder Theorem.

UNIT 2

Indeterminate equations: Linear and second degree Diophantine equations Congruence in one unknown, congruences of higher degree with prime and composite modulo, Wilson's theorem, Pell's theorem, Sums of two squares, Sums of four squares, The Fermat equation: Exponent 3, Cubic curves with infinitely many Rational points, The equation $y^2 = x^3 + k$

UNIT 3

Quadratic Reciprocity: Quadratic residues, Law of Quadratic Reciprocity, The Legendre symbol, The Jacobi symbol, Square roots modulo p , Cubic and biquadratic Reciprocity, Law of biquadratic Reciprocity, The constructability of Regular polygons.

UNIT 4

Primality and Factoring: Pseudoprimes, The rho method, Fermat factorization and factor bases, The continued factorization method, The quadratic sieve method. Elliptic Curves: Basic facts, group properties, Elliptic curve primality test, Elliptic curve factorization.

UNIT 5

Applications of Number Theory: Cryptography, Authentication, Signature Schemes, Indistinguishable data transfer, Bit commitment, Zero Knowledge protocol.

TEXTS:

1. Kenneth Ireland, 'A Classical introduction to Modern Number Theory', 2nd Ed. Michael Rosen, Springer 2004
2. Tom M. Apostol, 'Introduction to Analytic Number Theory', Narosa Publishing House

REFERENCES:

1. Niven & H.S. Zuckerman, 'Introduction to the theory of Numbers'. 3rd Ed., John Wiley & Sons, New York 1992.
2. Melvyn B. Nathanson, 'Methods in Number Theory', Springer, 2005
3. Neal Koblitz, 'A Course in Number Theory and Cryptography', 2nd Ed. Springer, 2004.
4. Neal Koblitz, 'Algebraic aspects of Cryptography' Springer, 1999.

E 2 – NUMBER THEORY AND CRYPTOGRAPHY

1

Divisibility: gcd, lcm, prime numbers, fundamental theorem of arithmetic, perfect numbers, floor and ceiling functions. Congruence: properties, complete and reduced residue systems, Fermat's theorem. Euler's function

2

Diophantine equations: Linear and second degree Diophantine equations. Congruence in one variable, Chinese remainder theorem, congruences of higher degree with prime and composite modulus, Wilson's theorem, quadratic residues.

3

Introduction to cryptography: attacks, services and mechanisms, security attacks, security services. Conventional Encryption – Classical techniques: model, steganography, classical encryption technique, Modern techniques: DES, cryptanalysis, block cipher principles and design.

4

Algorithms: triple DES, IDEA, blowfish. Confidentiality: Placement of encryption function, traffic confidentiality, key distribution, random number generation. Public key encryption – RSA algorithm, key management and exchange, elliptic curve cryptography.

5

Message Authentication: requirements, functions and codes, hash functions, security of hash functions MACS. Hash algorithms: MD5 message digest algorithm, secure hash algorithm. Digital Signature: authentication protocols, digital signature standard, Authentication Applications: Kerberos

Text Books:

1. Elementary Theory of Numbers – C.Y.Hsiung, Allied Publishers (World Scientific) New Delhi – 1992 (**Unit 1 & 2**)
2. Cryptography and Network Security Principles and Practice – W. Stallings Pearson Education Asia – 1999 (**Unit 3,4, & 5**)

Reference:

1. Introduction to Analytic number theory – Tom M. Apostol, Narosa Publishing House
2. An Introduction to the theory of Numbers – Niven & H.S.Zuckerman 3/e John Wiley & Sons, New York 1992.
3. The Mathematics of ciphers number theory and RSA cryptography – S.C.Coutinho- Universities Press (India) Pvt.Ltd. – 1999.
4. Applied Cryptography: Protocols, Algorithms & Source Code in C _ B.Schnier 2/e John Wiley & Sons Ny.1996.
5. Neal Kohlitz – A course in Number Theory and Cryptography – Springer
6. An Introduction to cryptography – Johannes A Buchmann Methods in Number theory- Melvyn B.Nuthanson .Sp.2005.

E3 - APPLIED PROBABILITY AND STATISTICS

UNIT 1: Basic Statistics: Collection, tabulation and presentation of data, measure of central tendency, dispersion, correlation, association and grouping of data.

UNIT 2: Probability: Sample space and events, Axioms of Probability, Additive theorem, Independence and Multiplicative theorem, Conditional Probability and Baye's theorem, Random experiments, Discrete and continuous random variables, Distribution function, Mean, Variance and moment generating function.

Probability Distributions: Genesis and basic properties of Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT 3: Sampling Distributions: Population and Samples, Simple random sampling with and without replacement. Sampling distribution of sample mean when variance is known and unknown, Chi-Square-, Student's-t- and F- distributions.

Estimation: Properties of estimates, Methods of estimation – method of maximum likelihood, method of moments and method of least squares. Illustration for each case.

UNIT 4: Interval estimation: Confidence interval for the mean of normal distribution when the variance is known and unknown, Two-sample confidence interval for normal population, Confidence interval for the proportions.

Testing of Hypothesis: Simple and composite hypotheses, Type I and Type II errors, power of a test, Tests of hypotheses on single sample, two-sample, proportions, Chi-square test of goodness of fit and independence.

UNIT 5: Regression Analysis: Simple linear regression, estimation of parameters in a linear regression model, measuring the adequacy of the regression model, One-way analysis of variance.

TEXTS:

1. Hines, W.W, Montgomery, D.C, Goldman, D. M. and Borror, C.M, 'Probability and Statistics in Engineering'. 4/e. 2003, John Wiley & Sons.
2. Walpole, R. E., Myers, R. H., Myers S L & Keying Ye, 'Probability and Statistics for Engineers and Scientists'. 8/e, 2007, Pearson Education

REFERENCES:

1. Gupta, S C and Kapur, V K, 'Fundamentals of Mathematical Statistics', Sultan Chand and Co.
2. Erwin Miller and John E.Freund, 'Probability and statistics for engineers' Prentice-Hall of India / Pearson , 7th Ed.

E4- WEB COMMERCE TECHNOLOGIES

Unit-I

Electronic Commerce Environment And Opportunities - Background, The Electronic Commerce Environment, Electronic Marketplace Technologies, Modes of Electronic Commerce – Overview, Electronic Data Interchange, Migration to open EDI, Electronic Commerce with WWW/Internet, Commerce Net Advocacy, Web Commerce Going Forward.

Unit-2

Approaches to Safe Electronic Commerce – Overview, Secure Transport Protocols, Secure Transactions, secure Electronic Payment Protocol, Secure Electronic Transaction, Certificates for Authentication, security on Web Servers and Enterprise Networks. Electronic Cash and Electronic payment Schemes- Internet Monetary Payment and Security Requirements, Payments and Purchase Order Process, On-line Electronic Cash.

Unit-3

Internet/Intranet Security Issues and Solutions – The Need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams. MasterCard/Visa Secure Electronic Transaction – Introduction, Business Requirements, Concepts, Payment Processing.

Unit-4

E-Mail and secure E-mail Technologies for Electronic Commerce -Introduction, The Means of Distribution, A Model for Message Handling, How Does E-mail Work, MIME, S/MIME, MOSS, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet References

Unit-5

Introduction to Servlets – Why Servlets, Servlet Basics, Servlet API Basics, Servlet, Running Servlets, Debugging Servlets, Beyond Servlet API Basics.

Texts:

1. Web Commerce Technology Handbook – Daniel Minoli & Emma Minoli, published Tata McGraw-Hill (1999)
2. Inside Servlets - Dustin R. Callaway, published by Addison Wesley Longman (Singapore) Pte. Ltd. (1999).

References:

1. Frontiers of Electronics Commerce. Ravi Kalakota Addison-Wesley Andrew B. Whinston ISE -1999
2. Internet Security Techniques Larry J. Hughes, Jr. New Riders -1995
3. Internet Security for Business Terry Bernstein et al. John Wiley & Sons Inc, 1996
4. Secure Commerce on the Internet Vijay Ahuja, AP Professional (Academic Press) 1997.

E5 – Object Oriented Design

Unit 1

Introduction: Object Orientation, OO Development, OO Themes, Evidence for usefulness of OO Development, OO Modeling History. Modeling Concepts: Modeling as a design Technique – Modeling, Abstraction, The three models. Class Modeling – Object and Class Concepts, Link and Association Concepts, Generalization and Inheritance, A Sample Class Model, Navigation of Class Models. Advanced Class Modeling – Advanced Objects and Class Concepts, Association Ends, N – ary Associations, Aggregation, Abstract Classes, Multiple Inheritance, Metadata, Reification, Constraints, Derived Data, Packages.

UNIT 2 :

State Modeling – Events, States, Transitions and Conditions, State Diagrams, State Diagram Behavior. Advanced State Modelling – Nested State Diagrams, Nested States, Signal Generalization, Concurrency, A Sample State Model, Relation of Class and State Models. Interaction Modeling – Use Case Models, Sequence Models, Activity Models. Advanced Interaction Modeling – Use Case Relationships, Procedural Sequence Models, Special Constructs for activity models. Concepts Summary – Class Model, State Model, Interaction Model, Relationships among the Models.

Unit 3:

Analysis and Design: Process Overview – Development stages, Development Life Cycle. System conception – Devising a System Concept, Elaborating a Concept, Preparing a Problem Statement. Domain Analysis – Overview of Analysis, Domain Class Model, Domain State Model, Domain Interaction Model, Iterating the Analysis.

Unit 4:

Application Analysis – Application Interaction Model, Application Class Model, Application State Model, Adding Operations. System Design – Overview of System Design, Estimating Performance, Making a Reuse Plan, Breaking a system into Sub Systems, Identifying Concurrency, Allocation of Subsystems, Management of Data Storage, Handling Global Resources, Choosing a Software Control Strategy, Handling Boundary Conditions, Setting Trade- off Priorities, Common Architectural Style, Architecture of the ATM System.

Unit 5:

Class Design – Overview of Class Design, Bridging the Gap, Realizing Use Cases, Designing Algorithms, Recursing Downward, Refactoring, Design Optimization, Reification of Behavior, Adjustment of Inheritance, Organizing a Class Design, ATM Example. Process Summary – System Conception, Analysis, Design. Implementation Modeling – Overview of Implementation, Fine – tuning Classes, Fine – tuning Generalizations, Realizing Associations, Testing.

Text Book :

Object Oriented Modeling and Design with UML, Second W Edition, PHI. Michael Blaha & James Rumbaugh., 2005

References:

- 1.UML Distilled – A Brief Guide to the Standard Object Modeling Language Second Edition, Pearson Education, Martin Flower and Kendall Scott 2004.
- 2.Practical OOD with UML Second Edition, Mark Priestly, 2004.
- 3.Design Patterns – Elements of Reusable Object Oriented Software Pearson Education, Erich Gamma et al 2002.

E6 - SECURITY IN COMPUTING

Unit 1:

Introduction: Security problem in computing – Meaning – Kinds of Security breaches – Computer Criminals – methods of defense

Cryptography: Terminology and background- Substitution ciphers- Transporations- Characteristics of good cipher- Symmetric and asymmetric encryption- Stream and Block Algorithm

Unit 2:

Secure encryption systems: DES- AES- Public key encryption- RSA, Merkle Hellman Knapsacks- Uses of Encryption

Secure Programs- Viruses and other malicious code, Controls against Program Threats

Unit 3:

Protection Services: Security methods of OS – Memory and address protection- Protection Mechanisms- User Authentication

Design of secure OS: Models of Security, Trusted OS design, Assurance Methods, Implementation examples.

Unit 4:

Levels of Security: Database security- Security versus Precision-Proposals for Multilevel security- Network security- Threats in Network security – IDS- Firewalls- security for email

Unit 5:

Other issues: risk analysis- Security Planning- Organizational security policies- Physical security- Modeling Cyber Security- Privacy principles and policies- Comparison of Copy right, Patent and Trade secret – Computer Crime- Ethical Issues in Computer Security

Text: P. Pfleeger, Shari Lawrence Pfleeger, '**Security in Computing**'. 4th Ed. Prentice Hall, 2007

Refernces:

1. Michael E. Whitman, '**Information Security: incidenr response and disaster recovery**', Cengage Learning, 2009
2. Wm. Arthur Conklin, Gregory B. White, Chuck Cotheren, Dwayne Williams, Roger Lavis, '**Principles of Computer Security-Security+and Beyond**', Dreamtech Press,

E7 - EMBEDDED SYSTEMS - II

(Elective- July 2010)

Unit 1 - Introduction to embedded systems:

Categories of embedded systems, overview of embedded system architecture, requirements of embedded system, challenges and issues related to embedded software development, recent trends in embedded system applications of embedded systems

Unit 2 - Architecture of embedded systems:

Hardware architecture- processor, memory- RAM, ROM and Hybrid memory, latches and buffers, clocking circuitry, watch dog timer and reset circuitry, chip select logic circuit. Input/output devices, SPI and I²C interfaces, Debug port-IEEE 1149. Power supply unit. Software architecture- Services provided by an operating system, Architecture of embedded operating systems, Categories of embedded operating systems: Non real-time embedded operating systems, Real-time operating systems, Mobile / Handheld operating systems, Application software, Communication software-TCP/IP protocol suite, Process of generating executable image- cross platform development, boot sequence. Development and testing tools-Hardware development and testing tools Software development and testing tools

Unit 3 - Programming for embedded systems:

Overview of ANSI C, GNU development tools, Bit manipulation using C-calculation of CRC, Memory management, Timing of programs, Device drivers-tools for device driver development, Productivity tools-makefile, debugger, profiler, indenting, revision control, Code optimization, C coding guidelines, programming C++, Programming in Java- Java 2 Micro Edition(J2ME), Server side programming, Java development tools

Unit 4 - Communication interface standards:

Need for communication interface, RS232/UART: RS232 communication parameters, RS232 connection configurations, UART, Null Modem cable connection, USB:USB physical interface, features of USB, IEEE 1394: features, protocol architecture, Ethernet: protocol architecture, CSMA/CD protocol, IEEE 802.11 CSMA/CA protocol, Bluetooth: Bluetooth system specifications, Bluetooth protocol architecture, Bluetooth state transition diagram, PCI Bus

Unit 5 - Embedded/Real time operating systems:

Architecture of the Kernel, Tasks and task scheduler- task states, context switching, scheduling algorithms, rate monotonic analysis, task management function calls, Interrupt service routines, Semaphores- semaphore management function calls, Mutex- mutex management function calls, Mailboxes- mailbox management function calls, Message queues- message queue management function calls, Event registers- event register management function calls, Pipes- pipe management function calls, Signals- signal management function calls, Timers- timer management function calls, Memory management, priority inversion problem-priority inheritance. Overview of Embedded/ Real-time operating systems: Embedded operating systems: Embedded NT, Windows XP Embedded, Embedded Linux. Real-time operating systems: QNX Neutrino, VX works, Micro C/OS- II, RT Linux. Handheld OS: Palm OS, Symbian OS

Textbooks:

1. Dr. K.V.K.K Prasad: Embedded / Real-time systems: Concepts, design and programming, Dreamtech press, 2009
2. Dr. K.V.K.K Prasad, Vikas Gupta, Avnish Dass, Ankur Verma: Programming for embedded system, Wiley Publishing, 2003

References:

1. Frank Vahid, Tony Givargis: Embedded system design: A unified hardware/software introduction, Wiley India, 2006
2. Steve Heath: Embedded System design, Newnes, 2009
3. David .E. Simon: An Embedded Software Primer, Pearson Education, 2008
4. Raj Kamal: Embedded Systems: Architecture, programming and design, Tata Mc Graw Hill Publishing Company limited, 2003
5. Jochen H. Schiller: Mobile communications, Pearson Education, 2003

E8 - LINUX SYSTEM PROGRAMMING

(Revised, July 2010)

UNIT 1

Linux Evolution, Introduction, and Setup, Main characteristics of Linux OS, Linux Distributions, Basic Linux installation and administration, General kernel responsibilities, Kernel Overview, Kernel modules, Linux versus other Unix like Kernels. Memory Addressing, Memory Addresses, Segmentation in Hardware, Segmentation in Linux, Paging in Hardware, Paging in Linux, Page Frame Management, Swapping, Swap Cache.

UNIT 2

Processes, Process structure, Process Table, Viewing processes, System processes, Process scheduling, Scheduling policy, The Scheduling Algorithm, System calls related to scheduling, Starting New processes, Waiting for a process, Zombie process. Signals, The Role of signals, Generating a signal, Delivering a signal, System calls related to Signal Handling.

UNIT 3

Interprocess communication, Pipes, FIFOs, Virtual file system, Virtual file system data structure, File system types, File system mounting, File locking, Managing I/O Devices, I/O Architecture, Device Drivers, The Ext 2 and Ext 3 File system. Networking, System calls related to Networking. Sending / Receiving packets from the Network Card.

UNIT 4

An Introduction to Device Drivers, Building and Running Modules, Char Drivers, Debugging techniques, Concurrency and Race conditions, Advance Char Driver Operations, Communicating with Hardware, Interrupt Handling.

UNIT 5

Embedded Linux, Architecture of Embedded Linux, Embedded Development Environment, GNU cross platform tool chain : GNU toolchain basics, Kernel Headers Setup, Binutils Setup, Bootstrap Compiler Setup, C Library Setup, Full Compiler Setup, Finalizing the toolchain Setup, Using the toolchain

Text Books

1. Understanding the Linux Kernel, Daniel P Bovet & Marco Cesati , O'Reilly, 3rd Edition, Nov 2005.
2. Linux Device Drivers, Jonathan Corbet, Alessandro Rubini , O'Reilly, 3rd Edition, Feb 2005.
3. Building Embedded Linux Systems, Karim Yaghmour, O'Reilly, 2nd Edition, Aug 2008.

References

1. Linux Kernel Development, Robert Love, Novell Press, 2nd edition, Jan 2005.
2. Linux Kernel Internals, Michael Beck, Harald Bohme, Addison-Wesley Professional, 2nd Edition, Dec 1997.
3. Beginning Linux Programming, Richard Stones, Neil Matthew, Wrox Press, 4th Edition, Nov 2007.
4. Embedded Linux Primer: A Practical Real-World Approach, Christopher Hallinan, PHI, 1st Edition, Sep 2006.
5. Embedded Linux System Design and Development, P. Raghavan, Amol Lad, Auerbach, 1st Edition, Dec 2005.

E9 - Java Programming

(July 2010)

Unit 1

Review of OOPs and Java Basics: Java Programming environment, fundamental programming structures in Java: comments, data types, variables, operators, strings, Input and Output, control flow, Big Numbers, Arrays. Objects Classes and Inheritance, Interfaces: Object cloning, Interfaces and call backs, Inner classes: local, Anonymous and static Inner classes, Basic event handling, Applets.

Unit 2

Swing programming: the model-view-controller design pattern, Introduction to layout management, Text Input, Choice components, Menus and Dialog Boxes, Exception handling basics.

Unit 3

Streams and Files: Streams, Text Input and Output, Random Access Files, Object Streams and serialization, File Managements.

Threads: Thread states, Thread creation, Thread properties, Synchronization and User interface Programming.

Unit 4

Collections: collection interfaces, concrete collections: LinkedList, ArrayList, HashSet, TreeSet, PriorityQueue, Maps. The collection frame works, Algorithms, Legacy collections: Hashtable class, Enumerations, Property Maps, Stacks and BitSets.

Database Programming: The design of JDBC, The Structured Query Language, JDBC configuration, executing SQL statements, Scrollable and Updatable Result sets, Row sets, Transactions, Advanced Connection management, LDAP.

Unit 5

Distributed Object: The roles of client and server, Remote method calls, The RMI programming model: setting up, parameter passing, server object activation.

Java Beans: creating beans, Using Beans to build an application, Naming patterns for Bean property types, BeanInfo classes, Property editors, Customizers, Java Bean Persistence.

Text Book:

Core Java - Horstmann and Coronell (8th edn), Volume 1 and 2 , Pearson Education (2008)

References:

- 1.Programming java5.0, James. P. Cohoon, Jack. W. Davison (Tata McGraw Hill)
- 2.An introduction to Object Oriented Programming with Java, C Thomas Wu, Tata McGraw Hill, 2006
3. JDBC:Java Database Connectivity, Bernard Van Haecke, IDG Books India (2000)

E10-Linux Internals

IT 1

roduction and Environmental setup, Main characteristics of Linux OS. Linux Distributions, Kernel overview. Linux versus other Unix like Kernels. Memory Addressing, Memory Addresses, Segmentation Hardware, Segmentation in Linux, Paging in Hardware in Linux.

IT 2

cess, Process structure, Process Table, Viewing processes, system processes, process scheduling, scheduling policy. The scheduling Algorithm, System calls related to scheduling, Starting New processes. iting for a process. Zombie process, Signals, The Role of signals, Generating a signal, Delivering a al, System calls related to Signal Handling.

IT 3

errupts and Exceptions, Role of interrupts signals, initializing the Interrupt Descriptor Table, Exception idling, Interrupt Handling, Kernel Synchronization, System calls.

IT 4

emory Management, Page Frame Management, Linux page Tables, page allocations and Deallocation, memory Area Management, Memory Mapping, Demand paging, The Linux page cache, Swapping, Swap he.

IT 5

rocess communication, pipes, FIFOs, Virtual file system, Virtual file system data structure, File em types, File system mounting, File locking, Managing I/O Devices, I/O Architecture, Device Drivers. : Ext 2 and Ext 3 File system. Networking, System calls related to Networking. Sending/Receiving kets from the Network Card.

at Book

derstanding the Linux Kernel, O' Reilly, Daniel P Bovet & Macro Cesati, 2nd Edition, 2004

erences

linux Iternals. Moshe Bar, TMH

linux Kernel Internals, 2nd Edition, Addition-wesley professional

linux Lernel Development, Robert Love, sams; I st edition

linux Device Drivers, 2nd Edition, O' Reilly

eginning Linux Programming, Richard Stones, Neil Matthew, Wrox Press.

E11 - COMPILER DESIGN

(Revised July 2010)

UNIT I

Introduction to Compilers, The fundamental principles of compilation, Structure of a Compiler, An overview of phases of a Compiler: a front end, an Optimizer, a Back end and Infrastructure, Properties of a Compiler. High level view of translation – Grammars and Languages, Checking Syntax, Checking Meaning, Creating and Maintaining Run Time Environment, Improving code, Creating Output program. Scanning – Introduction, Recognizing words, Automatic Scanner construction, A formalism for Recognizers – Finite Automata, Regular Expressions. From Regular Expression to Scanner and Back, Regular Expression to NFA, NFA to DFA, DFA to Minimal DFA, DFA to Regular Expression, Two Pass Scanners.

UNIT 2

Parsing – Introduction, Context Free Grammars, Backus – Naur Form, Ambiguous Grammar. Context Free Grammar vs Regular Expressions. Classes of Context Free Grammar and their Parsers. Top Down Parsing, Bottom Up Parsing, Building LR(1) Tables. Context Sensitivity Analysis, Data Types – Type Systems, Type Checking, The Attribute Grammar Framework, Ad – hoc System Directed Translation.

UNIT 3

Intermediate Representations – Graphical Intermediate Representations – Parse Tree, Abstract Syntax Trees, DAG, Graphs – Control Flow Graph, Dependence Graph. Linear Intermediate Representations – Stack Machine Code, Three Address Code. Auxiliary Data Structures. The procedure abstraction – techniques. Name Spaces, Scopes and Activation Records, Managing Memory.

UNIT 4

Code Generation, Assigning storage locations, Arithmetic operator, Boolean and Relational operators, Storing and accessing Arrays. Control Flow Constructs (Structured and Unstructured), Procedure calls. Machine Independent Optimization – Introduction, Goal of Optimization, Considerations for Optimization, Opportunities for Optimization, Scope of Optimization. Redundant Expressions – DAG, Value Numbering, Value Numbering over regions larger than basic blocks. Global Redundancy elimination.

UNIT 5

Machine Dependent Code Optimization, Instruction Selection – a TREE WALK Approach, TREE PATTERN MATCHING, PEEPHOLE OPTIMIZATION, TREE PATTERN MATCHING ON Quads. Instruction Scheduling – Introduction, List Scheduling, Regional Scheduling. Instruction Allocation – Introduction, Back ground issues, Local Register allocation and assignment, Global register allocation and assignment.

Text Book : Keith D. Cooper & Linda Torczon, '**Engineering a Compiler**', Elsevier, 2004.

- References :**
1. Alfred V. Aho, Ravi Sethi, Jeffrey D Ullman, '**Compiler: principles ,Techniques and Tools**', Addison Wesley, 1986
 2. Allen I Holub, '**Compiler Design in C**', Prentice Hall, 1993
 3. Andrew W. Appel, '**Modern Compiler Implementation in C**', Revised Ed., Cambridge University Press 2000
 4. Y N Srikanth, Priti Shanker, '**Compiler Design Handbook: Optimization and Code Generation**' , CRC Press

E12 - Advanced Java Programming

(Revised -,July 2010)

UNIT 1

Core Java Overview: Object oriented concepts, Exception Handling, Multi Threading Introduction to JDBC : Overview of JDBC API, The Java.sql package, JDBC Drivers, Executing SQL commands using JDBC Drivers, static and dynamic Execution of SQL statements, Execution of Stored Procedures using JDBC. Introduction to Transactions and Transaction Methods. Introduction to JNDI, Introduction to Data Source and Connection pooling, Introduction to Web Applications, Web Servers Overview of J2EE Technologies.

UNIT 2

Introduction to Java Servlets, Static and Dynamic contents, Servlet life Cycle and Life cycle methods, Servlet Request and Response Model, Deploying a Servlet, Servlet State Transitions, ServletConfig and ServletContext, Servlet Redirection and Request Dispatch, Servlet Synchronization and Thread Model. Maintaining Client State: Cookies, URL rewriting, Hidden form fields, Session Tracking. Introduction to JSP : JSP & Servlet as Web Components, Servlets vs. JSP, JSP Lifecycle, JSP Page Lifecycle Phases, General Rules of Syntax, JSP syntactic elements, JSP element syntax, Template content. Introduction to JSP elements, JSP Standard Actions

UNIT 3

J2ME Overview: Inside J2ME -How J2ME is organized, J2ME and Wireless Devices

Small Computing Technology: Wireless Technology-Mobile Radio Networks, Messaging, PDAs, Mobile Power, set Top Boxes, smart cards.J2ME Architecture and Development Environments: J2ME Architecture, Small computing Device Requirements, MIDlet programming, J2ME Software Development Kits, Helloworld J2ME Style, J2ME Wireless Toolkit.

UNIT 4

J2ME User Interfaces :Commands, Items and Event Processing.-Display class, Command Class, Item Class, Exception handling.Overview of High-Level Display: Screens: Alert Class, Form Class, Item Class, List Class, Text Box Class, Overview of Low-Level Display: Canvas: The Canvas, User Interactions, Graphics.

UNIT 5

Record Management System: Record Storage, Writing and Reading Records, Sorting and Searching Records.J2ME Database Concepts: Database Schema, Foreign keys, The Art of Indexing-Drawbacks of Using an Index, Clustered Keys, Derived Keys, Selective Rows, JDBC and Embedded SQL-Introduction: tables, Indexing, Inserting Data into Tables-Insert a Row, Selecting Data from a Table-Select All data, Request One column and multiple columns, Request Rows, Request Rows and Columns. Metadata, Updating and Deleting Data from a table. Views: Rules for using Views Create a view, Group and Sort Views: Personal Information Manager: PIM Databases, The Contact databases, The Event databases, Error Handling.

Text Books:

1. Professional Java Server Programming- J2EE 1.3 Edition- Subrahmanyam Allamaraju and Cedric Buest- Apress publication-2007
2. J2ME- The Complete Reference- James Keogh- TATA McGRAW-HILL -2007

References:

1. Inside Servlets-A Server Side Programming for the Java platform- Dustin R Callaway-Pearson Education Asia-2005
2. Beginning JavaServer Pages- Vivek Chopra, Jon Eaves, Rubert jones, Sing Li,John T. Bell-wrox publications-2005
3. Beginning J2EE 1.4 With foreword by Ivor Horton-Kevin Mukhar and James L.Weaver-Apress publication-2004

E13 - Advanced Java- Mobile Programming

(,July 2010)

UNIT 1

Core Java Overview: Object oriented concepts, Exception Handling, Multi Threading Introduction to JDBC : Overview of JDBC API, The Java.sql package, JDBC Drivers, Executing SQL commands using JDBC Drivers, static and dynamic Execution of SQL statements, Execution of Stored Procedures using JDBC. Introduction to Transactions and Transaction Methods.

UNIT 2

J2ME Overview: Inside J2ME -How J2ME is organized, J2ME and Wireless Devices

Small Computing Technology: Wireless Technology-Mobile Radio Networks, Messaging, PDAs, Mobile Power, set Top Boxes, smart cards.

J2ME Architecture and Development Environments: J2ME Architecture, Small computing Device Requirements, MIDlet programming, J2ME Software Development Kits, Helloworld J2ME Style, J2ME Wireless Toolkit.

UNIT 3

J2ME Best Practices and Patterns, Commands, Items and Event Processing: J2ME User Interfaces- Display class, Command Class, Item Class, Exception handling.

High-Level Display: Screens: Alert Class, Form Class, Item Class, List Class, Text Box Class.Low-Level Display: Canvas: The Canvas, User Interactions, Graphics

UNIT 4

Record Management System: Record Storage, Writing and Reading Records, Sorting and Searching Records, J2ME Database Concepts: Database Schema, Foreign keys, The Art of Indexing- Drawbacks of Using an Index, Clustered Keys, Derived Keys, Selective Rows, Exact matches and Partial Matches. JDBC and Embedded SQL; tables, Indexing, Inserting Data into Tables-Insert a Row, Selecting Data from a Table-Select All data ,Request One column and multiple columns, Request Rows , Request Rows and Columns. Metadata, Updating and Deleting Data from a table. Views: Rules for using Views Create a view, Group and Sort Views:

UNIT 5

Personal Information Manager: PIM Databases, The Contact databases, The Event databases, Error Handling, Introduction to Web services: Basics, J2EE Multitier Web Services Architecture, Inside WSDL, J2ME MIDlets and Web services, RMI Concept, SOAP Basics, WSDL and SOAP.

Text Books:

1. J2ME- The Complete Reference- James Keogh- TATA McGRAW-HILL -2007
2. Professional Java Server Programming- J2EE 1.3 Edition- Subrahmanyam Allamaraju and Cedric Buest- Apress publication-2007

References:

1. Beginning J2ME: From Novice to Professional, Third Edition (Novice to Professional) - Sing Li – Apress Publication-2005
2. J2ME in a Nutshell- Kim Topley- Oreilly- 2005
3. Core Java-Volume II-Advanced Fetaures-Cay S.Horstmann.Gary Cornell-Prentice Hall-7th Edition

E14 - Web Enabled Java Programming

(July 2010)

UNIT 1

Core Java Overview: Object oriented concepts, Exception Handling, Multi Threading Introduction to JDBC : Overview of JDBC API, The Java.sql package, JDBC Drivers, Executing SQL commands using JDBC Drivers, static and dynamic Execution of SQL statements, Execution of Stored Procedures using JDBC. Introduction to Transactions and Transaction Methods. Introduction to JNDI, Introduction to Data Source and Connection pooling, Introduction to Web Applications, Web Servers Overview of J2EE Technologies.

UNIT 2

Introduction to Java Servlets, Static and Dynamic contents, Servlet life Cycle and Life cycle methods, Servlet Request and Response Model, Deploying a Servlet, Servlet State Transitions, ServletConfig and ServletContext, Servlet Redirection and Request Dispatch, Servlet Synchronization and Thread Model. Maintaining Client State: Cookies, URL rewriting, Hidden form fields, Session Tracking.

UNIT 3

Introduction to JSP : JSP & Servlet as Web Components, Servlets vs. JSP, JSP Lifecycle, JSP Page Lifecycle Phases, General Rules of Syntax, JSP syntactic elements, JSP element syntax, Template content. JSP elements- directives, declarations, expressions, scriptlets, actions. JSP Standard Actions: jsp:useBean, jsp:getProperty, jsp:setProperty, jsp:include, jsp:forward, jsp:plugin, jsp:param, java Server Pages Standard Tag Library(JSTL).

UNIT 4

Introduction to JSF Frameworks: Getting started: A Simple Example, Sample Application Analysis, Development Environments for JSF. Managed Beans: A Sample Application, Bean Scopes Configuring Beans, Navigation, Static Navigation , Dynamic Navigation, Standard JSF tags, Data tables, conversion and validation Overview of the Conversion and Validation Process , Using Standard Converters. Event Handling: Life Cycle Events, Value Change Events, Action Events , Event Listener Tags, Immediate Components, Passing Data from the UI to the Server , Custom Components, Converters and Validators: Classes for Implementing Custom Components, Tags and Components, The Custom Component Developer's Toolbox, Encoding: Generating Markup, Decoding: Processing Request Values , Using Converters, Implementing Custom Component Tags, The TLD File, The Tag Handler Class, Defining Tag Handlers in JSF 1.1.

UNIT 5

AJAX : Ajax Fundamentals , JavaScript Libraries, The Prototype Library , The Fade Anything Technique Library, Form Completion. Realtime Validation, Propagating Client-Side View State Direct Web Remoting, Ajax Components, Hybrid Components, Keeping JavaScript Out of Renderers, Transmitting JSP Tag Attributes to JavaScript Code, Ajax4jsf, Implementing Form Completion with Ajax4jsf, Implementing Realtime Validation with Ajax4jsf. Introduction to Java Web Services, Future Trends in Web Technology WEB 2.0 and Beyond- Flex.

Text Books:

1. Professional Java Server Programming- J2EE 1.3 Edition- Subrahmanyam Allamaraju and Cedric Buest- Apress publication, 2007.
2. Core JavaServer Faces- Second Edition- David Geary, Cay Horstmann- Prentice Hall- 2007

References:

1. Inside Servlets- A Server Side Programming for the Java platform- Dustin R Callaway- Pearson Education Asia- 2005
2. Beginning JavaServer Pages- Vivek Chopra, Jon Eaves, Rubert Jones, Sing Li, John T. Bell- wrox publications- 2005
3. Beginning J2EE 1.4 With foreword by Ivor Horton- Kevin Mukhar and James L. Weaver- Apress publication- 2004
4. Pro JSP 2- Fourth Edition- Simon Brown, Sam Dalton, Daniel Jepp, David Johnson, Sing Li, and Matt Raible- Edited by Kevin Mukhar- Apress Publication- 2005
5. *JavaServer Faces in Action*- KITO D. MANN- MANNING publications Co- 2005
6. Pro JSF and Ajax , Building Rich Internet, Components- Jonas Jacobi and John R. Fallows Apress Publications- 2006
7. Flex 3 In Action- Manning Publications Company- 2009

E15 - Data Mining

(July 2008)

- Unit – 1 An overview of data mining:** Data Mining: applications, Knowledge discovery, Challenges, Data mining tasks, Examples.
Data: Different types of data, Quality of data, Data preprocessing methods. Measures of similarity and dissimilarity of data.
- Unit -2** The Iris data sets, Summary statistics, **Visualization:** Motivations, General concepts, Techniques of visualization, Visualizing higher dimensional data, Overview of OLAP and multidimensional data analysis.
- Unit-3 Basic concepts of classification:** Definition, Descriptive and Predictive modeling, General approach to solving a classification problem, Decision Trees, Model overfitting Evaluating the performance of a classifier, Methods for Comparing classifiers.
- Alternative Techniques of Classification:** Rule based classifier, Nearest neighbor classifiers, Bayesian classifiers, Artificial neural networks.
- Unit - 4 Association analysis:** Basic concepts: Problem Definition ,Frequent Item set generation, Rule generation, compact item sets, Alternative methods for generating frequent item sets. Evaluation of association patterns.
- Unit - 5 Cluster analysis:** Basic concepts And algorithms: K means, Agglomerative hierarchical clustering, DBSCAN, Cluster evaluation .
- Basics of anomaly detection:** Preliminaries, Statistical approaches.

Text Book:

Introduction to Data Mining. Pang-Ning Tan Michael Steinbach, Vipin Kumar, Pearson -2006 .

Reference:

1: Data Mining: Practical Machine Learning Tools and Techniques (Second Edition) Ian H. Witten, Eibe Frank, Morgan Kaufmann June 2005.

2: Data Mining Techniques: Arun K. Pujari– Universities Press-2006.

E16 - SOFTWARE PROJECT MANAGEMENT

UNIT I

Introduction to Management – Management: Science, Theory and Practice – Definition of Management: It's nature and purpose, The aim of all managers Science or Art? The Systems approach to Operational Management, The functions of Managers. Software Engineering Project Management: Major issues of Software Engineering, Functions and activities of Management, planning, organizing, staffing, directing and controlling a software Engineering Project.

UNIT 2

Project Evaluation: Strategic Assessment, technical Assessment, Cost-benefit analysis, cash flow forecasting, cost-benefit evaluation techniques, Risk evaluation.

Selection of an appropriate project approach: Choosing Technologies, technical plan contents list, choice of process models, structure versus speed of delivery, The Waterfall model, The V-process model, the spiral model, Software prototyping, other ways of categorizing software prototypes. Controlling changes during prototyping, incremental delivery, dynamic systems development method, Extreme programming Managing iterative processes, selecting the most appropriate process model.

UNIT 3

Software Effort Estimation: Problems with over and under estimates, The basis for Software estimating, Software effort estimation techniques, expert judgment, estimating by analogy, Albrecht function point analysis, function points Mark II, Object points, a procedural code –oriented approach, COCOMO: A parametric model.

UNIT 4

Activity planning: The objectives of activity planning, When to plan, Project Schedules, Projects and activities, Sequencing and scheduling activities, Network planning models, Formulating a network model, Adding the time dimension, The forward pass, The backward pass, Identifying the critical path, Activity float, Shortening the project duration, Identifying critical activities, Activity-on-arrow networks. Risk Management: The nature of risk, types of risks, Managing Risk, Hazard Identification, Hazard Analysis, Risk planning and control, Evaluating risks to the schedule.

UNIT 5

Monitoring and control: Creating the framework, Collecting the data, Visualizing progress, Cost monitoring, Earned value, prioritizing monitoring, Getting the project back to target, change control Managing Contracts: Types of contracts, Stages in contract placement, Typical terms of a contract, Contract Management, acceptance. Managing people and organizing teams: Understanding behavior, Organizational behavior: a background, Selecting the right person for the job, instruction in the best methods, Motivation, The Oldham-Hackman job characteristics Model, Working in groups, Becoming a team, Decision making, Leadership, Organizational structures, Stress, Health and Safety.

REFERENCES:

1. Software Project Management by Bob Hughes and Mike Cotterell, Tata McGraw-Hill Edition 2004.
2. Software Engineering Project Management Edited by Richard H Thayer, Wiley-IEEE, Computer Society Press, 2004.
3. Software Project Management- A unified framework by Walker Royce, Pearson Education, 2003.
4. Software Engineering-a Practitioner's approach by Roger S Pressman, Sixth Edition, Tata McGraw-Hill 2004.
5. Software Management By Donald J Reifer, Sixth Edition, Wiley-IEEE Computer Society Press, 2002.

E17 - CRYPTOGRAPHY AND NETWORK SECURITY

UNIT I

Foundations of Cryptography and Security – Ciphers and Secret Messages, Security Attacks and Services, Mathematical Tools for Cryptography, Substitutions and Permutations, Modular Arithmetic, Euclid's Algorithm, Finite Fields, Polynomial Arithmetic, Discrete Logarithms, Conventional Symmetric Encryption Algorithms, Theory of Block Cipher Design, Feistel Cipher Network Structures, DES and Triple DES, Strength of DES.

UNIT 2

Modern Symmetric Encryption Algorithms, IDEA, CAST, Blowfish, Twofish, RC2, RC5, Rijndael (AES), Key Distribution, Stream Ciphers and Pseudo Random Numbers, Pseudo Random Sequences, Linear Congruential Generators, Cryptographic Generators, Design of Stream Cipher, One Time Pad.

UNIT 3

Public Key Cryptography – Prime Numbers and Testing for Primality, Factoring Large Numbers, RSA, Diffie-Hellman, ElGamal, Key Exchange Algorithms, Public-Key Cryptography Standards

UNIT 4

Hashes and Message Digests – Message Authentication, MD5, SHA, RIPEMD, HMAC, Digital Signatures, Certificates, User Authentication, Digital Signature Standard, Security Handshake Pitfalls, Elliptic Curve Cryptosystems.

UNIT 5

Authentication of Systems, Kerberos, Electronic Mail Security, Pretty Good Privacy, IP and Web Security, Secure Sockets and Transport Layer, Electronic Commerce Security, Electronic Payment Systems, Secure Electronic Transaction, Digital Watermarking.

Text:

Behrouz A Forouzan, Cryptography and Network Security, Tata Mc Graw Hill, 2005

Reference:

William Stallings, Cryptography and Network Security, Principles and Practices. 3rd Ed., Pearson Education, 2005.

E18 - INTELLIGENT SYSTEMS

Unit I:

Basic concepts of Neural Network – Network properties – Learning in simple neurons – single layer perceptrons – multi layer perceptrons

Unit 2:

Supervised and unsupervised learning – Back propagation – derivation – Kohonen self organizing Networks – algorithms – learning vector quantization.

Unit 3:

Recurrent Networks – Hopfield networks – Boltzmann machines – Adaptive resonance theory- architecture and operations- algorithm- Associative memories.

Unit 4:

Fuzzy sets- Introduction- crispsets- Notion of fuzzy set- Basic concepts of fuzzy sets- classical logic (overview) - fuzzy logic.

Unit 5:

Operations on fuzzy sets- fuzzy complement – union- intersection- combination of operations – fuzzy relations – equivalence and similarity relations- fuzzy relational equations-applications.

Texts:

1. Limin Fu, 'Neural networks in computer intelligence', McGraw Hill Inc, 1994.
2. Didier Dubois and Henri Prade, 'Fuzzy sets and systems : theory and applications', Academic Press, 1980.

References:

1. Wasserman P.D, 'Neural computing: theory and practice', Van Nostrand Reinhold, New York, 1989.
2. George J.Klir and Tina A.Folger, 'Fuzzy sets, uncertainty and information', Prentice Hall, 1988.

E19 - VISUAL PROGRAMMING VB.NET

(Revised July 2012)

Visual Basics Keywords and Syntax, Enhancing a sample application, Object Oriented Terminology, Working with Visual Basic Types, Commands conditional, Value types, Reference types, Parameter passing, variable scope, working with objects, Data type conversion, creating classes, Advanced concepts.

Custom objects, Inheritance, Multiple Interfaces, Abstraction, Encapsulation and Polymorphism. CLR, Memory management, Namespaces – Creating your own Namespaces, Exception handling and debugging, structured exception handling. Arrays Collections and Generics

An introduction to XML.ADO.NET and LINQ, Basic ADO features, .NET Data Providers, The DataSet Component, Data Binding, LINQ to SQL, LINQ to SQL and Visual Basics, Working with SQL server.

Widows Forms, Controls, Advanced Windows forms, inheriting from an existing control, the control and user control base classes, Composite user control

Working with ASP.NET – Building ASP.Net application using webforms, Data driven Applications, Windows Services, Using IIS application services, Interacting with windows services, creating windows services, Security in Windows framework.

Professional Visual Basic 2010 and .NET4; Bill Sheldon, Kent Sharkey, Jonathan Merbutt, Rob Windsor, Gatson C Hiller, Wiley publishing 2010

nces:

1. Professional VB 2005 with .NET 3.0 – Bill Evjen, Billy Hollis, Rockford Lhotka, Tim Mc Carthy, Wiley Publishing 2007
2. Steven Holzner, ‘Visual Basic .NET Programming Black Book’.
3. Carneron Wakefield, Henk-Evert Sonder, Wei Meng Lee, ‘VB.NET Programming Developer’s Guide’.
4. Professional VB.NET 2003— Bill Evjen, Billy Hollis, Rockford Lhotka, Tim Mc Carthy, Jonathan Pinnovk, Rama Ramachandran, Bill Sheldon. 2004

E20 - DIGITAL IMAGE PROCESSING

(Elective July 2008)

UNIT I:

Introduction: What is digital image processing Origins, application areas, Fundamental steps in digital image processing, components of an image processing system.

Digital Image Fundamentals: elements of visual perception, light and electromagnetic spectrum, image sensing and acquisition, image sampling and quantization, some basic relationship between pixels.

Intensity Transformations: Basics of intensity transformations, some basic intensity transformation functions, histogram processing.

UNIT 2:

Spatial Filtering: fundamentals of spatial filtering, smoothing and sharpening filters.

Frequency domain Filtering: Background, preliminary concepts, sampling, Fourier transforms and DFT, 2-D DFT and properties, frequency domain filtering, low pass filters, high pass filters, implementation.

UNIT 3:

Image restoration and Reconstruction: Noise models, restoration in the presence of noise, linear-positive invariant degradations, inverse filtering, Wiener filtering, constrained least square filtering, geometric mean filter.

Color Image Processing: color fundamentals, color models, pseudo color and full color image processing, color transformations, smoothing and sharpening, noise in color images.

UNIT 4:

Image Compression: fundamentals, basic compression methods, digital image watermarking, color image compression.

Morphological Image Processing: preliminaries, erosion and dilation, opening and closing, some basic morphological algorithms, gray-scale morphology.

UNIT 5:

Image Segmentation: fundamentals, point, line and edge detection, thresholding, region based segmentation, use of motion in segmentation.

Text:

Digital Image Processing, by Rafael C. Gonzalez & Richard E. W
3rd edition, PHI 2008

Reference:

1. *Fundamentals of Digital Image Processing*, by Anil K. Jain, Prentice Hall, 1995.
2. *Digital Image Processing*, by William K. Pratt, John Wiley & Sons Inc., 3rd edition, 2001.

E 21 - SOFTWARE QUALITY

Pre-requisite: Software Engineering

Unit 1

Software Quality in Business Context : The meaning of Quality, The quality challenge, Why is Quality important, Quality control vs. Quality Assurance at each phase of SDLC, Quality Assurance in Software Support projects, The QA function (Nina. S. Godbole). Software Quality Assurance: + Quality Concepts – Quality, Quality control, Quality Assurance, Cost of Quality. Software Quality Assurance Background issues, SQA Activities, Software Reviews – Cost impact of Software Defects, Defect Amplification and removal. Formal Technical reviews- The review meeting, Review reporting and Record keeping, Review guidelines, Sample-driven reviews. Formal approaches to SQA, Software Reliability – Measures of Reliability and Availability, Software Safety. The Software Plan. (Pressman).

Unit 2

Product Quality and process Quality: Introduction, Software Systems evolution, Product Quality, Models for Product Quality, Process Quality, Software Measurement and Metrics: Introduction, Measurement during Software life cycle Context, Defect Metrics, Metrics for Software Maintenance, Classification of Software Metrics, Requirements related metrics, Measurements and Process Improvement, Measurement principles, Identifying appropriate Measures and Metrics for Projects, Metrics implementation in projects, Earned Value Analysis, Issues in Software Measurements and Metrics program implementation, Object- Oriented Metrics: An Overview (Godbole)

Unit 3

ISO 9001: What is ISO 9000, How does ISO carry out its work, ISO Standards Development Process. How does the ISO 9000 family of standards work, ISO 9001:2000, ISO Certification Surveillance Audits/RE-certification/Recertification Audits. Six Sigma- Introduction, What is six sigma in statistical context, How does six sigma work.

Unit 4

Software CMM and other process improvement models: CMM for software- an overview. Practices followed in mature organizations, Types of CMMs, CMM-Integrated model – What is CMM-I, Background to the CMMI MODEL, Types of CMM-I models, Other models for Software Process Improvement and excellence – ISO 12207, IEEE 1074, Malcom Baldrige National Quality Award, The EFQM Excellence Model, People – CMM.

Unit 5

Software Testing – Overview, Purpose of Testing, Differences between Inspection and Testing, Testing vs. Debugging, Testing Life Cycle, Test Artifacts, The Test Plan, The V-Model for testing Phases, Testing Techniques – Equivalence partitioning, Boundary value Analysis, State Transition Analysis, GUI Testing, Performance Testing, Reliability Testing, Risk-based testing. Gray Box Testing, Extreme testing, Test process improvement framework

Text Book :- Nina S Godbole, 'Software Quality Assurance: principles and practice', Narosa Publishing House, 2004 Edition.

References :

Roger S. Pressman, 'Software Engineering: a practitioner's approach 6th Ed. (International Edition, 2005) Tata McGraw-Hill

Alka Jarvis and Vern Crandall, 'Inroads to software quality: how to guide and toolkit', Prentice-Hall PTR, 1998

Pankaj Jalota, 'Software Engineering principles', Narosa Publishing House, 2000.

Richard Fairley, 'Software Engineering concepts', Tata McGraw-Hill, 2001.

Software Project Management – collection of white papers – foreword by Richard H Thayer – Wiley Student Edition, 2000.

E22 - Android Application Programming

(Introduced July 2011)

Unit 1:

Background, Introduction to Android Programming – Native Android Applications, Android SDK features, Development Framework. Developing for Android, Developing for Mobile Devices, Android Development Tools.

Unit 2:

Android Applications – Introduction to Application Manifest, Manifest Editor. Android Application Life Cycle- Application Priority, Process States, Externalizing Resources. User Interface Design, Elements, Layout. Common Application Programming Interfaces, Intents, Broadcast Receivers, Adapters and Internet.

Unit 3:

Data Storage, Retrieval and Sharing - Saving Data, Saving and Loading Files, Databases in Android, Introducing Content Providers

Unit 4:

Location based Services - Setting up Emulator, Location Provider. Using Geocoder , Proximity alerts. Maps – Creating Map Based Services, Example. Introducing Services, Background worker Threads, Using Alarms.

Unit 5:

Networking and Web- Peer – to Peer Communication – Instant Messaging , SMS. Accessing Android Hardware – Media API's , Camera, Sensor Manager, Accelerometer and Compass, Telephony, Bluetooth. Managing Network and Wi – Fi Connections. Controlling Device Vibration.

Text Book

1. Professional Android Application Development. Reto Meier, Wrox Publications 2009. Second Edition

References :

1. Android wireless application development. Shane Conder, Lauren Darcey, Addison Wesley Publications 2010 Second Edition.
2. The Android Developer's Cookbook: Building Applications with the Android SDK James Steele, Nelson to Addison Wesley Publications 2010 First Edition.

E23 – Web Application Design Using PHP

(Introduced July 2011)

Unit 1 Introduction to PHP, Language Features. PHP Basics, PHP's Supported Data Types, Identifiers, Variables, Constants, Expressions, String Interpolation, Control Structures, Functions, Arrays, Strings and Regular Expressions, Working with the File and Operating System.

Unit 2 Object-Oriented PHP, Advantages of OOP, OOP Concepts, Constructors and Destructors, Static Class Members, The instance of Keyword. Advanced OOP Features - Object Cloning, Inheritance, Interfaces, Abstract Classes, Namespaces.

Unit 3 PEAR - Using the PEAR Package Manager, Introducing Pyrus. Date and Time - PHP's Date and Time Library, Date Fu. Error and Exception Handling - Error Logging, Exception Handling.

Unit 4 Handling File Uploads - Uploading Files via HTTP, PHP. PHP and LDAP - Using LDAP from PHP. Session Handlers - Configuration Directives, Working with Sessions, Creating Custom Session Handlers. Working with HTML Forms - PHP and Web Forms, Validating Form Data.

Unit 5 Authenticating Your Users - HTTP Authentication Concepts, Authenticating Users with PHP. Web Services – XML – Loading and Parsing XML. Security - Hiding Configuration and Sensitive Data, Data Encryption. Introducing the Zend Framework - Introducing MVC, PHP and Zend Framework. Using PHP with MySQL - Interacting with the Database.

Text Book :

Beginning PHP and MySQL,W. Jason Gilmore, Apress, 2010, Fourth Edition

References

- 1.PHP6 and MySQL, Steve Suehring, Tim Converse and Joyce Park, Wiley India 2010, Second Edition
2. HTML4 Complete, E.Stephen Mask, Janan Platt BPB Publications, First Edition 1998.

E 24 - MULTIMEDIA SYSTEMS DESIGN

(Introduced July 2011)

Unit 1

Introduction to Multimedia – Definitions, CD-ROM and the Multimedia highway. Uses of Multimedia – Introduction to making multimedia, Multimedia skills.

Unit 2

Multimedia Hardware – Macintosh versus windows, Networking Macintosh and windows computers, Connections, Memory and storage devices, Input devices, Output hardware, Communication devices. Basic Software Tools – Text editing and word processing tools, Painting and Drawing tools, 3-D modeling and animation tools, Image editing tools, Sound editing tools, Animation, Video and Digital movie tools. Multimedia authoring tools.

Unit 3

Text: Fonts and Faces, Using Text in Multimedia, Computers and Text, Sounds-Multimedia System Sounds, Digital Audio, Making MIDI Audio, Audio File formats, MIDI Versus Digital Audio, Production Tips. Images – Making Still images, Color – Understanding natural light and color, computerized color, color palettes, Animation – The principles of Animation, Animation by computer.

Unit 4

Video-Using video, How video works, Broadcast video standards, Analog video, Digital video, Shooting and Editing video, Optimization video files for the CD-ROM. Tools for the world wide web–Web servers, Web Browsers, Web page makers and site builders. Plug-ins and delivery vehicles. Designing for the world wide web–Working on the web, Text for the web, Images for the web, Sound for the web, Animation for the web.

Unit 5

Planning and Costing – The process of making multimedia, scheduling, estimating Designing and Producing, Content and Talent – Using content created by others – Using content created for a project, Using Talent, Delivering – Testing, Preparing for Delivery Delivering on CD ROM, Delivering on world wide web.

Text Book :

1. Tay Vaughan, “Multimedia: Making It Work” – TATA McGraw-Hill , Seventh Edition 2008.

References :

1. James E. Shuman, “Multimedia in Action” – Vikas Publishing House, First Edition, 1998 reprint.
2. Casanova John Villamil, Molina. Louis, “Multimedia An Introduction” – Prentice Hall of India Pvt. Ltd., Eastern Economy Edition, First Edition, 1997.

E25 MICROPROCESSOR PROGRAMMING

(Introduced July 2012)

UNIT 1

Microprocessors Microcomputers and Assembly Language, Organization of a Microprocessor based system, Microprocessor Instruction Set and Computer Languages.

8085 Assembly Language Programming – Programming model, Instruction set, instruction, data format and storage, write assemble and execute a program.

UNIT 2

Microprocessor architecture and operations, Memory, I/O devices, Microcomputer system, Logical devices

Microprocessor architecture – 8085 MPU, Memory interfacing, Interfacing I/O devices

UNIT 3

Introduction to 8085 Instructions, Programming techniques, Counters and time delays, stack and subroutine, Code conversion, BCD Arithmetic and 16-bit Data Operations

UNIT 4

Interrupts –8085 Interrupt, 8085 vectored interrupts, Interfacing Data converters – Digital to Analog, Analog to Digital. Programmable interface devices – Basic concepts, 8155 multipurpose Programmable devices, 8279 Programmable keyboard/Display interface.

UNIT 5

8255A Programmable peripheral interface - Interfacing keyboard and seven segment display, Bidirectional data transfer between two micro computers, 8254 Programmable Interval timer,

TEXT:

Ramesh Gaonkar, **Microprocessor Architecture Programming and Applications with the 8085**, Penram International publishing, 5th edition 2008

REFERENCES:

1. K. R. Venugopal, Raj Kumar, 'Microprocessor X86 Programming', 1st Ed, BPB Publications, Reprinted 2005.
2. Aditya P Mathur, 'Introduction to Microprocessors', 15th Reprint, Tata McGraw-Hill, 1989.
3. Gilmore, 'Microprocessors Principles and Applications', 2nd Ed, 3rd Reprint, Tata McGraw-Hill, 2007.
4. A. Nagoor Kani, 'Microprocessor 8086 Programming and Interfacing', 1st Ed, 6th Reprint. RBA Publications, 2010.

UNIT 1

Embedded Computing: Introduction, Complex Systems and Microprocessor, Embedded System Design Process, Formalisms for System Design, Design Examples.

The 8051 Architecture: Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts

.

UNIT 2

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

UNIT 3

Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Serial Data Communication. Introduction to Real – Time Operating Systems:

Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT 4

Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real – Time Scheduling Considerations, Saving Memory and Power.

UNIT 5

Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

Text Books:

1. **An Embedded Software Primer**, David E. Simon; Pearson Education, 2009.
2. **The 8051 Microcontroller and Embedded Systems**; Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, Prentice Hall 2007

References:

1. Embedded Systems, Rai Kamal, 13th reprint 2007, Tata-McGrawHill Publications.
2. Fundamentals of embedded software: Where C and assembly meet. Daniel.W.Lewis PHI 2005.
