COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER APPLICATIONS
KOCHI – 682 022, KERALA, INDIA

MCA – SYLLABUS
(2015 ADMISSION)

MASTER OF COMPUTER APPLICATIONS (MCA) - COURSE STRUCTURE

(2015 Admission)

Semester I

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2101	Introduction to Computer Science	50	50	3
CAS2102	Programming in C	50	50	4
CAS2103	Computer Organization	50	50	4
CAS2104	System Software	50	50	3
CAS2105	Discrete Structures and Graph Theory	50	50	3
CAS2106	C Programming LAB**	50	50	2
Total				19

Semester II

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2201	Data Base Management Systems	50	50	3
CAS2202	Object Oriented Programming with C++	50	50	3
CAS2203	Operating System	50	50	3
CAS2204	Data Structures and Algorithms	50	50	3
CAS2205	Elective I	50	50	3
CAS2206	C++ and DBMS Programming LAB**	50	50	2
Total				17

Semester III

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2301	Advanced Data Structures and Algorithms	50	50	3
CAS2302	Computer Graphics	50	50	3
CAS2303	Software Engineering	50	50	4
CAS2304	Elective II	50	50	4
CAS2305	Elective III	50	50	3
CAS2306	Data Structures and Graphics LAB**	50	50	2
Total				19

Semester IV

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2401	Networks and Data Communications	50	50	3
CAS2402	Applied Numerical Techniques	50	50	3
CAS2403	Elective IV	50	50	3
CAS2404	Elective V	50	50	3
CAS2405	Mini Project Work	50	50	4
CAS2406	Networking & Network Programming LAB**	50	50	2
Total				18

Semester V

Course Code	Paper	Marks		Credit
		Internal	External	
CAS2501	Simulation and Modelling	50	50	4
CAS2502	Elective VI	50	50	3
CAS2503	Elective VII	50	50	3
CAS2504	Elective VIII	50	50	3
CAS2505	Elective IX	50	50	3
CAS2506	Seminar	100	0	3
Total				19

Semester VI

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

List of Electives

ELECTIVE I

E1	-	Number Theory
E2	-	Number Theory and Cryptography
E3	-	Applied Probability and Statistics
E4	-	Web Commerce Technologies
E5	-	Multimedia System Design
E6	-	JAVA Programming

ELECTIVE II & III

E7	-	Digital Electronics
E8	-	Object Oriented Design
E9	-	Advanced Java Programming #
E10	-	Web Enabled JAVA Programming#
E11	-	Operations Research
E12	-	Principles of Programming Languages

ELECTIVE IV & V

E13	-	Advanced JAVA Mobile Programming
E14	-	Visual Programming VB.NET
E15	-	Android Application Programming
E16	-	Web Application Design using PHP
E17	-	Security in computing
E18	-	Software Project Management
E19	-	Cryptography and Network Security
E20	-	Intelligent Systems
E21	-	Digital Image Processing
E22	-	Web Application Development with advanced PHP and Zend Framework

ELECTIVE VI

E23	-	Artificial Intelligence
E24	-	Data Mining
E25		Theory of Computation

ELECTIVE VII

E26	-	Software Quality
E27	-	Wireless Security*
E28	-	Natural Language Processing

ELECTIVE VIII

E29	-	Object Oriented Software Engineering*
E30	-	Secure Software Engineering*
E31	-	Security threats and Vulnerabilities *
E32	-	Artificial Neural Networks

ELECTIVE IX

E33	-	Software Testing*
E34	-	Steganography and Digital water marking*
E35	-	Speech and audio processing*

#Only one elective from E9 & E10 can be selected for the entire course.
*Syllabus to be approved by the Board of Studies

NOTE:
   ** Students are expected to do at least 20 programs covering all the units of the prescribed syllabi of the concerned subjects. During the examination one or two programs are expected to be asked from the above topics which can be completed in three hours of time.

CAS 2101 INTRODUCTION TO COMPUTER SCIENCE
(July 2015)

UNIT I   **Computer Basics**- Algorithms, Simple Model of computers, Characteristics of computers, Problem Solving Using Computers. **Data Representation** – Character representation, Integer Representation, fraction representation, Hexadecimal Representation, Decimal to Binary conversion, Error Detecting codes. **Input/Output devices** – input devices, output devices, soft copy devices, hard copy devices.

UNIT II   **Computer Memory** – Memory Cell, Organization, ROM, Serial Access Memory, Physical devices used to construct memories, Magnetic hard Disk, Floppy Disk drives, CDROM, Magnetic tape drive**. Processor** – Structure of Instructions, Description of Processor, Machine Language Program, Algorithm to simulate Hypothetical Computer. **Binary Arithmetic** – Addition, subtraction, Signed numbers, Two's Complement Representation of Numbers, Addition/Subtraction of Two's Complement Notation, Binary Multiplication, Division, Floating point Representation

UNIT III   **Data Base Systems**- File Oriented approach, Data base oriented approach, data base views, 3 schema architecture, data base model , components of data base management systems, retrieving data through queries.
Computer Architecture- Interconnection of Units, Processor to Memory Communication, I/O to Processor communication, Interrupt structures, Bus Architecture, Multiprogramming, RISC, Virtual Memory. **Computer Languages** – Need for Programming Language, assembly language, HLL, Compiling HLL

UNIT IV   **Operating Systems**- Need for OS, Batch Operating System, Multiprogramming OS, Time sharing OS, Personal Computer OS, Unix OS, Microkernel Based OS, Online and Real Time Systems, Process Management ,Memory Management, File Management, Device Management. **Voice and Data Communications** – types of communications, Characteristics of communication channels, allocation of channel, physical communication media, Public switched Telephone Networks, Cellular communication, Establishing communication Paths. ATM Networks. **Computer Networks** – Introduction to Computer network, Connecting media, data transmission mode, data multiplexing, data switching, data routing techniques, network topologies, types of network, networking devices, open system interconnection model.

UNIT V   **Computer Graphics-** Display devices, Overview of Display methods, Raster Scan Display processing unit, Input devices for interactive graphics, Programmers model of Interactive graphics system, Image acquisition and storage, storage formats for picture, Image acquisition with a digital camera , **Emerging Computer Technologies –** distributed networking, peer to peer computing, grid computing, cloud computing, utility computing, On demand computing, wireless network , blue tooth, Artificial Intelligence.

TEXT BOOK

1. V.Rajaraman and Neeharika Adabala, "Fundamentals of Computers", 6th ed, PHI Learning private limited, 2015
2. Reema Thareja, "Fundamentals of Computers" 1st ed, Oxford University press, 2014

REFERENCES
1. Pradeep K Sinha and Priti Sinha, "Computer Fundamentals", 6th ed, BPB publications, 2004
2. Ron White, "How Computers work"10th ed, QUE mac Millan computing Publications, USA, 2014

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CAS 2102 PROGRAMMING IN C
(Revision 2014)

UNIT I   **Introduction**-Computers, Classification of Computers, Numbers, System Software, Software life cycle, Algorithms, Flowchart, Structured programming, compilers, Operating System, Preprocessor, Linker, Running a C program.
Introduction to C programming- Character Set, Identifiers and Keywords , Variables – Declaration of variables, initialization, Characters and character String, Data Type , Qualifiers, typedef, Promotion and type casting, Constants, operators and expressions.

UNIT II   **Basic Input –Output-**Single character input output, string input output, general input output, types of characters in format string, scanf width specifier.
Control Structures –if, if else, multiway decision, compound statement, Loops – while, for, do while, Switch, Break, Continue, Go to and labels.

UNIT III   **Functions**–Introduction, main function, function parameters, return value, Recursion, Comparison of Iteration and recursion.
Scope and Extend
Arrays and strings - Introduction**,** Multi-dimensional arrays, strings, arrays of strings, Functions in string.

UNIT IV   **Pointers**-Introduction, Definition and uses of Pointers Address Operator &, Pointer Variables, Dereferencing Pointers ,Void Pointers, Pointer Arithmetic, Pointer to pointers, Pointers and arrays, Passing arrays to function, Pointers and functions, Array of Pointers, Pointers and strings, pointers to functions.

UNIT V   **Structures and Union-**Introduction, Declaring and using structures, structure initialization, structure within a structure, operations on structures, array of structures, pointers to structures, Unions, operations on union, difference between structures and union.
Files -File structure, File handling functions, file types, Error Handling.

TEXT BOOK

K.R .Venugopal, S.R Prasad,"Mastering C", 11th Reprint, Tata McGraw-Hill, 2011.

REFERENCES

1. Kernighan, Brain W and Ritchie, Dennis M, 'The C Programming Language'. 2nd Ed. Prentice Hall, 2007.
2. Yashavant Kanetkar , 'Let Us C', BPB Pulication. 6th Ed. 2005
3. Byron Gottfried, 'Programming with C', 2nd Ed. Schaim's ouline series, 2002.
4. Les Hancock and Morris Krieger, 'The C Primer', McGraw-Hill, 1987

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CAS 2103 COMPUTER ORGANIZATION

UNIT I 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, Basis I/O operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions. Basics of Electronic Logic Gates and Flip-flops

UNIT II 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 III 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 IV 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 V 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 BOOK

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.

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CAS 2104 SYSTEM SOFTWARE

UNIT I   **Assembler:** Basic Assembler Functions, Machine-Dependent Assembler Features, Machine-Independent Assembler Features, Assembler Design Options, Implementation Examples.

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

UNIT III   **Macro Processor:** Basic Macro Processor Functions, Machine-Independent Macro Processor Features, Macro Processor Design Options, Implementation Examples.

UNIT IV   **Compiler:** Basic Compiler Functions, Machine-Dependent Compiler Features, Machine-Independent Compiler Features, Compiler Design Options, Implementation Examples.

UNIT V   **Operating system:** Basic Operating System Functions. Machine-Dependent Operating System features, Machine-independent Operating System features. Operating System Design Options, Implementation Examples.

TEXT BOOK

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

REFERENCE

1. Donovan J.J: Systems Programming Mc Graw Hill, 1972
2. Dhamdhere 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

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CAS 2105 DISCRETE STRUCTURES & GRAPH THEORY

(July 2015)

UNIT I   Sets - Sub-sets - Operations on sets - Algebraic Properties of Set Operations - The Addition Principle – Propositions and Logical Operations – Logical connectives and Compound Statements – Quantifiers – Conditional Statements

UNIT II   Product sets - Partitions – Relations and Digraphs – Sets arising from relations – The Matrix of a relation – The Digraph of a relation – Paths in Relations and Digraphs – Properties of Relations – Reflexive and Irreflexive Relations – Symmetric, Asymmetric and Antisymmetric Relations – Transitive Relations – Equivalence Relations and Partitions

UNIT III   Partially Ordered Sets – Hasse Diagrams – Topological Sorting – Isomorphism – External Elements of Partially Ordered Sets – Algorithm – Lattices – Isomorphic Lattices – Properties of Lattices – Special Types of Lattices – Finite Boolean Algebras – Functions on Boolean Algebras – Boolean Polynomials

UNIT IV   Graphs – Subgraphs and Quotient Graphs – Euler Paths and Circuits – Algorithm Fleury's Algorithm – Hamiltonian Paths and Circuits – Transport networks – Maximum flow – Labeling algorithm, Max Flow Min cut Theorem – Graph coloring – Chromatic number – chromatic polynomials – Trees : Rooted tree – siblings – Ordered Tree – Binary Tree – Subtree

UNIT V   Binary Operations – Properties of Binary Operations – Semigroups – Isomorphism and Homomorphism – Groups – Rings – Fields – Fermat's Little Theorem

TEXT BOOK

Discrete Mathematical Structures for Computer Science (6th Ed): Bernard Kolman, Robert Busby & Sharon Cutler Ross PHI (2013)

REFERNCES

1. Graph Theory with Applications to Engineering & Computer Science: Narsingh Deo, PHI (2014)
2. Rings, Fields and Groups: An Introduction to Abstract Algebra (2nd Ed): Reg Allenby (2013)
3. First look at graph theory (1st Ed): John Clark & Derek Allan Holton, Allied Publishers (1995)
4. Elements of Discrete Mathematics : L CL Liu, TMH (2005)
5. Discrete Mathematics, Malik Zesen, Cengate (2008)

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CAS 2201 DATABASE MANAGEMENT SYSTEMS

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

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

UNIT V   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 BOOK

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 Mnagement Sstems**', 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

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CAS 2202 OBJECT-ORIENTED PROGRAMMING WITH C++

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

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

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

TEXTBOOK

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

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CAS 2203 Operating System

UNIT I   **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 II   **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 III   **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 IV   **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 V   **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

Silberschatz, Galvin, Gagne, "Operating System Concepts", Wiley-India, 6th Ed, 2003.

REFERENCES

1. Andrew Tanenbaum "Introduction to Operating System",3rd edn . Pearson, 2006

2. Williams Stallings"Operating Systems: Internals and Design Principles" 5th edn. Pearson, 2006

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CAS 2204 DATA STRUCTURES & ALGORITHMS

(Revised 2015)

UNIT I **Introduction**: Algorithm Specification, Data Abstraction, Performance analysis – Space complexity, Time complexity, Asymptotic Notations.
Arrays: Introduction, Dynamically allocated arrays, Polynomials, Sparse Matrices, Representation of Multidimensional Arrays.

UNIT II **Stack:** Definition and operations on stack, Applications of stack, Recursion, Back tracking, removal of recursion – examples, Conversion of infix to postfix – Evaluation of postfix expression.
Queue: Definition and operations on queue, Circular queue and De queue – implementation, Priority queue.
Linked lists: – Singly, Doubly and Circular lists, Application of linked lists, Polynomial manipulation, Linked stacks and queues.

UNIT III **Trees:** Terminology and representation, Binary trees – Representations, Binary tree traversals – pre-order, in-order & post-order. Expression trees, Threaded binary trees, Binary search tree – Insertion, Deletion and Search, AVL trees, Red Black trees , Introduction to B trees and B+ trees.
Heaps: Max heap – Insertion and deletion, Binomial heap, Fibonacci heap.

UNIT IV **Graphs**: Graph representations - Adjacency matrices, Adjacency lists. Graph traversals – DFS, BFS. Minimum Cost Spanning tree – Kruskal Algorithm, prims algorithm. Shortest path – Dijkstra's algorithm, All Pairs Shortest Path.

UNIT V **Searching**: Linear Search, Binary Search, and Fibonacci Search.
Sorting: Selection, Bubble, Insertion, Quick, Merge, Heap, Count, Radix Sort. Introduction to external sorting.
Hashing: Hash tables, Hashing functions, Overflow handling Techniques.

TEXT BOOK

Ellis Horowitz, Sartaj Sahni and Anderson Freed " **Fundamentals of Data Structures in C" (Second edition),**Universities Press, 2008.

REFERENCES

1. Aaron M.Tanenbaum, Yedidyah Langsam, Moshe J.Augenstein, "Data Structures using C", Prentice Hall International, Inc., Englewood Cliffs, NJ, 2009.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C" (Second edition), Pearson Education India, 2001.
3. Alfred V Aho, John E Hopcroft and Jeffrey D Ullman, "Data Structures and Algorithms", Pearson Education India, 1987.

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CAS 2301 ADVANCED DATA STRUCTURES AND ALGORITHMS

UNIT I   Mathematics Review, background model – Algorithm analysis – running time calculations – General rules – Solutions for the maximum subsequence sum problem – Logarithms in the running time – checking analysis.

UNIT II   Abstract Data Type (ADT) – List ADT – Array implementation of lists – Linked List – Doubly and circularly linked lists – Stack ADT – Queue ADT – Trees: Binary trees – Binary search trees -B-Trees

UNIT III   Hashing: Hash function – open Hashing – Closed Hashing – Priority Queues (Heaps): Binary Heap – Applications of priority queues Sorting: Insertion Sort – Shell Sort – Heapsort – Mergesort – Quicksort. Binomial Heaps- Fibonacci Heaps- Disjoint Sets- Union by Rank and Path Compression

UNIT IV   Graph Algorithms: Topological sort – Shortest Path algorithms – Network Flow Problems – Minimum Spanning tree – Application of DFS. Bipartite Matching.

UNIT V   Algorithm Design Techniques – Geedy Algorithms: Scheduling problem – Huffman codes – Approximate bin packing – Divide and Conquer: Running time of Divide and Conquer algorithms – Closest – Points problem – The selection problem – Theoretical Improvements for Arithmetic Problems.

REFERENCES

1. Data Structures and Algorithms Analysis in C++, Mark Allen Weiss, 3rd Ed, Pearson Education Asia, 2009.

2. Introduction To Design And Analysis Of Algorithms, **Levitin, 2nd**, Darling Kendesly India, 2008**.**

3. Data Structures, Algorithms and Applications in C++, Sartaj Sahni , 2nd Ed, Silicon Press, 2005

4. Introduction to Algorithms, T. H. Cormen, C. E. Leiserson, R. L. Rivest, Prentice Hall, 2004.

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CAS 2302 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, Elipse generating algorithms, Filled-Area primitives, character generation.
Attributes of output primitives: Line, curve, area-fill, character and bundled attributes, Antialiasing

UNIT II   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 III 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, Beizer 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 IV   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 V   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 BOOK

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 Gaphics', Mc Graw Hill, 1981.

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CAS 2303 SOFTWARE ENGINEERING

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

UNIT III   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 IV   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 V   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

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CAS 2401 NETWORK AND DATA COMMUNICATIONS

(Revised July 2010)

UNIT I   **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 II   **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 III   **The Network Layer**: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality Of Service, Internetworking, The Network Layer in the Internet

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

UNIT V   **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.

TEXTBOOK

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.

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CAS 2402 APPLIED NUMERICAL TECHNIQUES
(July 2014)

UNIT I   Kinds of Errors in Numerical Procedures
Solving Nonlinear Equations: Interval Halving (Bisection), Linear Interpolation Methods, Newton's Method, Muller's Method, Fixed-Point Iteration:x=g(x) Method, Newton's method for polynomials, Bairstow's method for quadratic factors.

UNIT II   Solving System of Equations: Matrices and Vectors, Elimination Methods, The Inverse of a Matrix and Matrix Pathology, Norms, Condition Number, Relaxations method, System of Non-linear equations, Iterative Methods

UNIT III   Interpolation and Curve Fitting: Interpolating Polynomials, Lagrangram Polynomials, Divided Differences, Spline Curves, Least-Squares Approximations

UNIT IV   Numerical Differentiation and Integration: Getting Derivatives, Extrapolation Techniques, Numerical Integration – The Trapezoidal Rule, Simpson's Rules, Composite formula, Adaptive Integration, Gaussian Quadrature, Multiple Integrals

UNIT V   Numerical Solution of Ordinary Differential Equations: The Taylor-Series Method, The Euler Method and Its Modifications, Runge-Kutta Methods, Multistep method: Milne's method, Adoms-Moulton Method
N.B: Programming Assignments may be given as part of Internal Assessment

TEXT BOOK

Applied Numerical Analysis, Curtis F Gerald, Patrick O Wheatley, Seventh Edition, Pearson, 2009

REFERENCES

1. Numerical Methods for Scientific and Engineering Computation, M.K. Jain, S.R.K. Iyengar, R.K. Jain 6th Edn., New Age International Publishers, 2012.

2. Numerical Methods: for engineering and Science, Rajesh Srivastava, Publisher: Oxford University Press (2010)
3. Computer Oriented Numerical Methods, Ragaraman V, PHI, 3rd Edn. 2009

4. Numerical Methods with Programs in C 1st Edition, T. Ramachandran, T.Veerarajan, Publisher: Tata McGraw-Hill Education (2007)

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CAS 2501 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 if Simulation – Continuous Simulation. Combined Discrete – Continuous Simulation – Examples, Monte Carlo Simulation, Advantages and Disadvantages of Simulation – Area of application.

UNIT II   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 III   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 IV   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 V   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 Simulation

TEXTBOOK

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.

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E1 NUMBER THEORY

UNIT I   *Unique Factorization*: Unique Factorization in Z, Infinitely many primes in Z, Σ(1/p) Diverges, The growth of π(x) Congruence: properties, complete and reduced residue systems, Fermat's theorem. Euler function, The Chinese Remainder Theorem.

UNIT II   *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 III   *Quadratic Reciprocity*: Quadratic residues, Law of Quadratic Reciprocity, The Legendre symbol, The Jacobi symbol, Square roots modulo p, Cubic and biquardatic Reciprocity, Law of biquardatic Reciprocity, The constructability of Regular polygons.

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

TEXT BOOK

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 Pvt. Ltd, New Delhi, (1996).

REFERENCES

1. Niven & H.S.Zuckerman, 'Introduction to the theory of Numbers'. 3rd Ed., John Wiley & Sons, New Yourk 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.

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E2 NUMBER THEORY AND CRYPTOGRAPHY

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

UNIT II Indeterminate equations: Linear and second degree Diophantine equations. Congruence in one unknown, Chinese remainder theorem, congruences of higher degree with prime and composite modulo, Wilson's theorem, quadratic residues.

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

UNIT IV 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.

UNIT V Message Authentication: requirements, functions and codes, hash functions, security of hash functions and 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 P:ractice – W. Stallings Pearson Education Asia – 1999 **(Unit 3,4, & 5)**

REFERENCES

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.

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E3 APPLIED PROBABILITY AND STATISTICS

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

UNIT II   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 III   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 IV   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 V   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.

TEXT BOOKS

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.

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

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

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

TEXT BOOKS

1. Web Commerce Technology Handbook – Daniel Minoli & Emma Minoli, published   Tata McGran-Hill (1999)
2. Inside Servlets - Dustin R. Callaway, published by Addison Weslay 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 Bernsteinetal. John Wiley & Sons Inc, 1996
4. Secure Commerce on the Internet Vijay Ahuja, AP Professional (Academic Press) 1997.

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E5 MULTIMEDIA SYSTEMS DESIGN

(July 2011)

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

UNIT II   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 III   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 IV   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 V   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 BOOKS

1. Tay Vaughan, "Multimedia: Making It Work" – TATA McGraw-Hill Edition, Sixth Edition 2004.

REFERENCES

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

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E6 JAVA PROGRAMMING

(July 2010)

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

UNIT III   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 IV   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 V   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)

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E7 DIGITAL ELECTRONICS

(JULY 2014)

UNIT I   Number Systems and codes: Binary, Octal and Hexa decimal number Systems-Binary Arithmetic, binary code, Excess-3code, Gray error detection and correction .Boolean Algebra: Poslulates and theorems, representation of switching functions –SOP and POS forms Karnaugh map representation–Minimization using K-maps.

UNIT II   Design of combinational circuits:-Tabular minimization: Design of single output and muti-output functions-Design using AND,OR,NOT ,NAND NOR and EX-OR gates, Logic circuits from Boolean Expressions. Design using MSI and LSI devices-Digital Multiplexer/Selector Decoder. Demultiplexer–Design of 4 bit adder, Carry look ahead adder BCD Convertor, Logic implementation using ROM, PAL and PLA

UNIT III Introduction   to   Sequential Ckts: combinational Versus sequential Circuits,Asymchronous Versus Synchronous circuits-Memory elements and their Excitation function-Tff, Dff, RSff, JK ffs and their excitation requirements –Design of Sequential Circuits- Shift Registers, Counters – Synchronous and Asynchronous counters, Up—Down counters, Modular Counter, Ring Counter, Johnson counter, Analysis of Sequential circuits-State table and Diagrams.

UNIT IV   Logic Families: RTL, DTL, TTL, CMOS – Tristate logic–Specification and transfer characteristics of basic TTL interfaces,-Standard

UNIT V   Logic levels-Current and voltage parameters-fan in and fan out – Propagation   delay,   Integrated   circuit   modules,   noise consideration-Interfacing of CMOS to TTL and interfacing of TTL to CMOS.

TEXT BOOK

Digital Logic Applications and Design", John M Yarbrough, Thomson Learning, 3rd edition, Pearson / PHI, Reprint 2006.

REFERENCES

1. Digital Design, M. Morris Mano, Michael D Ciletti, 4th Edition, Pearson Education, 2008.
2. **Modern Digital Electronics, R P Jain,** Tata McGraw-Hill Education, 2003.

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E8 OBJECT ORIENTED DESIGN

UNIT I   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 II   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. Interation 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 III   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 IV   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 V   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 WEdition, 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 etal 2002.

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E9 ADVANCED JAVA PROGRAMMING
(Revised -,July 2010)

UNIT I   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 II   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, Servlet Config and Servlet Context, 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 III 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 IV   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 V   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

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E10 WEB ENABLED JAVA PROGRAMMING
(July 2010)

UNIT I 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 II 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 III 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:getPreoperty, jsp:setProperty, jsp:include, jsp:forward, jsp:plugin,jsp:param,java Server Pages Standard Tag Library(JSTL).

UNIT IV 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 V 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 Apresss Publications-2006
7. Flex 3 In Action-Manning Publications Company-2009

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E11 OPERATIONS RESEARCH

UNIT I   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 II   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 III   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 IV   Dynamic programming: Deterministic and Probabilistic Dynamic programming, Linear Programming By Dynamic Programming Approach

UNIT V   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.Guptha, 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.

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E12 PRINCIPLES OF PROGRAMING LANGUAGES

(July 2014)

UNIT I   Programming domains. Language Evaluation. Programming paradigms- Imperative programming, Functional programming, Object oriented programming, Logic programming. Formal methods of describing syntax and semantics - Backus Naur Form, Attribute grammars. Describing semantics - Denotational semantics

UNIT II   Datatypes, Names, Variables, Bindings, Scope and lifetime, Referencing Environments-NamedConstants-Variable Initialization– Subprograms - Parameter Passing - Coroutines.

UNIT III   Data abstraction and encapsulation. Polymorphism and inheritance. Features of object- Oriented languages- Smalltalk, C++ and Java. Design and implementation issues. Exception handling.

UNIT IV   Functional programming languages- Lambda calculus –Introduction to pure LISP. Application of functional programming languages.

UNIT V   Logic programming languages- a brief introduction to predicate calculus – Horn clauses- Logic programming. Introduction to Prolog. Applications of Logic programming

TEXT BOOK

1. RobertW.Sebesta,"**Concepts of Programming Languages**" Addison-Wesley; 10th edition, 2012
2. RaviSethi,"Programming Languages-concepts and constructs",AddisonWesley, 2nd Edition, 1996.

REFERENCES

1. MichaelL.Scott,"Programming Language Pragmatics– Elsevier, 1999

2. Thomson Learning, Kenneth.C.Louden, "Programming Languages: Principles and Practices", Brooks/cole Publishing Company, 2ndEd, 2002.

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E13 ADVANCED JAVA- MOBILE PROGRAMMING
(July 2010)

UNIT I   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 II   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 III   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 IV   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 V   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

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E14 VISUAL PROGRAMMING VB.NET
(Revised July 2012)

UNIT I   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.

UNIT II   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

UNIT III   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.

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

UNIT V   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.

TEXTBOOKS

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

REFERENCES

1. Professional VB 2005 with .NET 3.0 – Bill Evjen, Billy Hollis, Rockford Lhotka, Tim Mc Carthy, Wiley Publishimg 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

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E15 ANDROID APPLICATION PROGRAMMING
(Revised July 2014)

UNIT I   Getting Started With Android Programming – What is Android ?, Android SDK installation and configuration, Anatomy of an Android application, Activities, Fragments and Intents-Understanding Activities, Linking Activities using intents, Fragments, Calling Built in applications using intents, Displaying Notifications.

UNIT II   The Android User Interface- Understanding the components of a screen, Adapting to display orientation, Managing changes to screen orientation, Creating the user interface programmatically, Listening for UI notifications, Designing User Interface with Views- Using basic views, Using Picker Views, Understanding Specialized fragments.

UNIT III   Data Persistence – Saving and Loading User Preferences, Persisting Data to Files, Creating and sing Databases. Content Providers - Sharing Data in Android, Using a Content Provider, Creating Your Own Content Providers.

UNIT IV   Messaging – SMS Messaging, Sending Email. Location-Based Services – Displaying Maps, Getting Location Data, Monitoring a Location.

UNIT V   Networking – Consuming Webservices using HTTP, Consuming JSON Services, Sockets Programming, Developing Android Services – Creating Your Own Services, Establishing Communication between a service and an activity, Binding Activities to Services, Understanding Threading, Publishing Android Applications.

TEXT BOOK

Wei-Meng Lee,"Beginning Android 4 Application Development", Wrox publications, 2012

REFERENCES

1. The Android Developer's Cookbook: Building Applications with the Android SDK James Steele, Nelson to Addison Wesley Publications 2010 First Edition.
2. Professional Android Application Development. Reto Meier, Wrox publications, 2009, Second   Edition

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E16 WEB APPLICATION DESIGN USING PHP

UNIT I   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 II   Object-Oriented PHP, Advantages of OOP, OOP Concepts, Constructors and Destructors, Static Class Members, The instanceof Keyword. Advanced OOP Features - Object Cloning, Inheritance, Interfaces, Abstract Classes, Namespaces.

UNIT III   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 IV   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 V   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.

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E17 SECURITY IN COMPUTING

UNIT I Introduction: Security problem in computing – Meaning – Kinds of Security breaches – Computer Criminals – methods of defense
Cryptography: Terminology and background- Substitution ciphers- Transporatations- Characteristics of good cipher- Symmetric and asymmetric encryption- Stream and Block Algorithm

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

UNIT V 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

TEXTBOOK

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

REFERENCES

1. Michael E. Whitman, '**Information Security: incident 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,

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E18 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 II   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 III 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 IV   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 V   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.

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E19 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 II   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 III   Public Key Cryptography – Prime Numbers and Testing for Primality, Factoring Large Numbers, RSA, Diffie-Hellman, ElGamal, Key Excahnge Algorithms, Public-Key Cryptography Standards

UNIT IV   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 V   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.

TEXTBOOK

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

REFERENCE

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

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E20 INTELLIGENT SYSTEMS

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

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

UNIT III   Recurrent Networks – Hopefield networks – Boltzmann machines – Adaptive resonance theory- architecture and operations- algorithm- Associative memories

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

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

TEXTBOOK

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.

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E21 DIGITAL IMAGE PROCESSING

(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 II   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 III   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 IV   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 V   Image Segmentation: fundamentals, point, line and edge detection, thresholding, region based segmentation, use of motion in segmentation.

TEXTBOOK

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

REFERENCES

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.

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E22 WEB APPLICATION DEVELOPMENT WITH ADVANCED PHP AND ZEND FRAMEWORK (JULY 2015)

UNIT I   Frameworks: What are Frameworks – An overview of popular PHP frameworks – Introduction to design patterns – Design patterns in Web Frameworks: Model-view-controller as the Main structural Design Pattern – Model-view-Presenter (MVP) and other design patterns

UNIT II   Working with databases – Understanding various approaches to object-relational mapping (ORM) – Configuring different database engines – Writing Schemas of object models – Using the command-line interface – Designing and implementing a simple application in Symfony – CakePHP and Zend Frameworks

UNIT III   Creating and using forms – Field validation – customizing forms – using captcha as span protection – sending plain text and HTML – Formatted e-mail – Including attachments and adding carbon copies – configuring SMTP servers and setting secure connections.

UNIT IV   Full-text searching and indexing – Sphinx searching engine with Symfony – Apache Lucene with Zend Framework – Setting secure SSL connections – Defending against XSS injection attacks – Securing forms against CSRF session hijacking

UNIT V   Introducing AJAx Including autocomplete feature into your text fields, creating basic CRUD – like Web services with REST – Using SOAP for enterprise web services – Testing SOAP web services with soapUI

TEXT BOOK

Building PHP Applications with Symfony, CakePHP and Zend Framework by Bartosz Porebski, Karol Przystalski, Leszek Nowak published 2011 by Wiley India.

REFERNCES

Zend Framework 2 Application Development: Christopher Valles 2013, Packet Publishing

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E23 ARTIFICIAL INTELLIGENCE

(Revised – July-2010)

UNIT I   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 II   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 III   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 IV   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 V   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.

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E24 DATA MINING
(July 2008)

UNIT I   **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 II   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 III   **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, Baysiean classifiers, Artificial neural networks.

UNIT IV   **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 V   **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 .

REFERENCES

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.

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E25 THEORY OF COMPUTATION
(July 2014)

UNIT I   Finite state systems NFA DFA, Equivalence of NFA and DFA, Equivalence of NFA and NFA with epsilon moves, regular expression, Equivalence of regular expression and finite automata, Finite automata with output associated with state, Finite automata with output associated with transition.

UNIT II   Equivalence of finite automata with output, applications of Finite automata, Pumping Lemma, closure properties of Regular sets, Decision algorithms, My Hill Nerode theorem ,minimization of DFA

UNIT III   Context Free grammars derivations parse Trees, ambiguity Simplification, CNF, GNF, PDA DPDA, equivalence of PDA and CFL, pumping lemma for CFL, Closure Properties, decision algorithms, CYK algorithm

UNIT IV   Turing machine, Techniques for construction of TM , storage in finite control, multiple tracks, shifting over, checking of symbols, subroutines, NDTM, undecidability, universal TM

UNIT V   Recursive and recursively enumerable languages, Properties, halting problem of TM Chomsky Hierarchy, equivalence of regular grammar and FA , equivalence of unrestricted grammar and TM, equivalence of LBA and CSL relation between languages

TEXT BOOKS

1. J E Hopcroft and J D Ullman Introduction to Automata Theory and Languages and Computation, Addison Wesley
2. Michael Sipser, Introduction to the Theory of Computation, Thomson Learning

REFERENCES

1. Misra and Chandrasekharan, Theory of Computation, Prentice Hall
2. H R Lewis Papadimitrou, Elements of Theory of Computation PHI
3. John Martin, Introduction to Language and Theory of Computation, TMH
4. Peter Linz, An Introduction to Formal Languages and Automata Narosa Publucation

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E26 SOFTWARE QUALITY

UNIT I   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 SLDC, Quality Assurance in Software Support projects, The SQA 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 abd Record keeping, Review guidelines, Sample-driven reviews. Formal Approaches to SQA, Software Reliability – Measures of Reliability and Availability, Software Safety. The SQA plan. (Pressman).

UNIT II   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 III   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/Re-Assessment Audits. Six Sigma-Introduction, What is six sigma in statistical context, How does six sigma work.

UNIT IV   Software CMM and other process improvement models: CMM for software- an overview. Practices followed at mature organizations, Types of CMMs, CMM-Integrated model – What is CMM-I, Background to the CMN-I 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 V   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

1   Roger S. Pressman, 'Software Engineering: a practitioner's approach 6th Ed. (International Edition, 2005) Tata McGraw-Hill
2   Alka Jarvis and Vern Crandall, 'Inroads to software quality: how to guide and toolkit', Prentice-Hall PTR, 1997
3   Pankaj Jalota, 'Software Engineering principles', Narosa Publishing House, 2000.
4   Richard Fairley, 'Software Engineering concepts' , Tata McGraw-Hill , 2001.
5   Software Project Management – collection of white papers – foreword by Richard H Thayer – Wiley Student Edition, 2000.

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E28 NATURAL LANGUAGE PROCESSING

UNIT I   Introduction to Natural Language Understanding: Linguistic Background-An Outline of English Syntax-Grammars and Parsing-Features and Augmented Grammars.

UNIT II   Grammars for Natural Language: Toward Efficient Parsing

UNIT III   Ambiguity Resolution: Statistical Methods

UNIT IV   Semantics and Logical Form: Linking Syntax and Semantics-Ambiguity Resolution-other Strategies for Semantic Interpretation-Scoping and the Interpretation of Noun Phrases.

UNIT V   Knowledge Representation and Reasoning-Local Discourse Context and Reference-Using World Knowledge-Discourse Structure-Defining a Conversational Agent.

REFERENCES

1. Integration of World Knowledge for Natural Language Understanding, **Ekaterina Ovchinnikova, Springer, 2012.**

2. Allen, James. Natural Language Understanding. The Benjamin/Cummings Publishing Company, Inc., Redwood City, CA. 1995.

3. Charniak, Eugene: Introduction to Artificial intelligence, Addison-Wesley, 1984.

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E32 ARTIFICIAL NEURAL NETWORKS

UNIT I   Basic concepts-single layer perceptron-Multi layer perceptron-Adaline-Madaline-Learning rules-Supervised learning-Back propagation networks-Training algorithm, Advanced algorithms-Adaptive network- Radial basis network modular network-Applications

UNIT II   Introduction- unsupervised learning -Competitive learning networks-Kohonen self organising networks-Learning vector quantisation - Hebbian learning – Hopfield network-Content addressable nature, Binary Hopfield network, Continuous Hopfield network Travelling Salesperson problem - Adaptive resonance theory – Bidirectional Associative Memory-Principle component Analysis

UNIT III   Introduction – crisp sets an overview – the notion of fuzzy sets – Basic concepts of fuzzy sets – classical logic an overview – Fuzzy logic. Operations on fuzzy sets - fuzzy complement – fuzzy union – fuzzy intersection – combinations of operations – general aggregation operations

UNIT IV   Crisp and fuzzy relations – binary relations – binary relations on a single set– equivalence and similarity relations – Compatibility or tolerance relations– orderings – Membership functions – methods of generation – defuzzification methods

UNIT V   Adaptive Neuro Fuzzy based inference systems – classification and regression trees: decision tress, Cart algorithm – Data clustering algorithms: K means clustering, Fuzzy C means clustering, Mountain clustering, Subtractive clustering – rule base structure identification – Neuro fuzzy control: Feedback Control Systems, Expert Control, Inverse Learning, Specialized Learning, Back propagation through Real –Time Recurrent Learning.

REFERENCES

1. Fuzzy Logic Engineering Applications", Timothy J. Ross, Mc GrawHill, NewYork, 2009.

2. "Fundamentals of Neural Networks", Laurene Fauseett, 3rd Ed, Prentice Hall India, New Delhi, 2008.

3. "Neuro Fuzzy and Soft computing", Jang J.S.R., Sun C.T and Mizutani E – Pearson education, 2004

4. "Neural networks, Fuzzy logics and Genetic algorithms", S. Rajasekaran and G.A. Vijayalakshmi Pai Prentice Hall of India,2003

5. Fuzzy Sets and Fuzzy Logic", George J. Klir and Bo Yuan, Prentice Hall Inc., New Jersey,1995

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