COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

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

MCA – SYLLABUS
(2016 ADMISSION)

Master of Computer Applications (MCA)
Course Structure for Choice Based Credit System
(2016 Admission onwards)

Semester I

Course Code	Paper	Marks		Credit
		Sessional	Final	
CAS 2101	Introduction to Computer Science	50	50	3
CAS 2102	Programming in C	50	50	4
CAS 2103	Computer Organization	50	50	4
CAS 2104	System Software	50	50	3
CAS 2105	Discrete Structures and Graph Theory	50	50	3
CAS 2106	C Programming LAB	50	50	1
CAS 2107	Mini Project	50		1
Total				19

Semester II

Course Code	Paper	Marks		Credit
		Sessional	Final	
CAS 2201	Data Base Management Systems	50	50	4
CAS 2202	Object Oriented Programming with C++	50	50	4
CAS 2203	Operating System	50	50	3
CAS 2204	Data Structures and Algorithms	50	50	3
	Elective	50	50	3
CAS 2206	C++ Programming LAB	50	50	1
CAS 2207	Mini Project	50		1
Total				19

Semester III

Course Code	Paper	Marks		Credit
		Sessional	Final	
CAS 2301	Advanced Data Structures & Algorithms	50	50	3
CAS 2302	Computer Graphics	50	50	3
CAS 2303	Software Engineering	50	50	4
	Elective	50	50	3
	Elective	50	50	3
CAS 2306	Data Structures LAB	50	50	1
CAS 2307	Mini Project	50		1
Total				18

Semester IV

Course Code	Paper	Marks		Credit
		Sessional	Final	
CAS 2401	Networks and Data Communications	50	50	4
CAS 2402	Applied Numerical Techniques	50	50	3
	Elective	50	50	3
	Elective	50	50	3
CAS 2405	Programming LAB	50	50	1
CAS 2406	Minor Project	150		3
Total				17

Semester V

Course Code	Paper	Marks		Credit
		Sessional	Final	
CAS 2501	Simulation and Modelling	50	50	4
	Elective	50	50	3
	Elective	50	50	3
	Elective	50	50	3
	Elective	50	50	3
CAS 2506	Seminar	50		1
CAS 2507	Course Viva	100		2
Total				19

Semester VI

Course Code	Paper	Marks		Credit
		Sessional	Final	
CAS 2601	Project Work and Viva Voce	200	200	16
Total				16

<p style="text-align: center">**List of Electives**
Changes in the electives and changes in grouping in electives are applicable to current batches also.</p>

Semester II

CAS 2221 – Number Theory
CAS 2222 – Web Commerce Technologies
CAS 2223 – Multimedia System Design
CAS 2224 – Digital Electronics

Semester III

CAS 2331 – Number Theory and Cryptography
CAS 2332 – Applied Probability and Statistics
CAS 2333 – JAVA Programming
CAS 2334 – Object Oriented Design
CAS 2335 – Operations Research

Semester IV

CAS 2441 – Web Enabled JAVA Programming#
CAS 2442 – Advanced JAVA Programming.#
CAS 2443 – Principles of Programming Languages
CAS 2444 – Advanced JAVA Mobile Programming
CAS 2445 – Visual Programming VB.NET
CAS 2446 – Android Application Programming
CAS 2447 – Web Application Design using PHP
CAS 2448 – Security in Computing
CAS 2449 – Cryptography and Network Security

 #   Only one elective can be selected among them

Semester V

CAS 2561 – Software Project Management
CAS 2562 – Intelligent Systems
CAS 2563 – Digital Image Processing.
CAS 2564 – Web Application Development with advanced PHP and Zend Framework.
CAS 2565 – Artificial Intelligence
CAS 2566 – Data Mining
CAS 2567 – Theory of Computation
CAS 2568 – Software Quality
CAS 2569 – Wireless Security
CAS 2570 – Natural Language Processing
CAS 2571 – Object Oriented Software Engineering
CAS 2572 – Secure Software Engineering
CAS 2573 – Security threats and Vulnerabilities
CAS 2574 – Software Testing
CAS 2575 – Steganography and Digital Water marking
CAS 2576 – Security Measures in Computing Systems
CAS 2577 – Compiler Design
CAS 2578 – Business Analytics

CAS 2101 INTRODUCTION TO COMPUTER SCIENCE
(July 2016 revision)

UNIT I   Introduction – Turing model – Data Processor, Programmable data processors, Von Neumann model- four sub systems, stored program concept, sequential execution of instructions. Computer Components, Data Storage – Data Types, Storing Numbers, Texts, Images, Audio, Video. Operations on Data – Logical Operations, Shift Operations, Arithmetic Operations. **(10 Hours)**

UNIT II   Computer Organization – CPU, Main Memory, Input/Output Subsystem, Sub System Interconnection, Program execution. Different Architectures, A Simple Computer.Computer Peripherals – Input Devices, Output devices, Serial Communication Links.

(8 Hours)

UNIT III   Computer Algorithms – Introduction – sequence, decision, repetition, Basic algorithms, sub algorithms. Computer Networks – Overview, Topologies, TCP/IP protocol suite, Internet. Operating System – Introduction, Evolution of OS, Components. **(10 Hours)**

UNIT IV   Programming Languages – Evolution, Translation, Programming paradigms – Procedural, Object Oriented, functional and declarative .Software Engineering – Software life cycle – Analysis, Design, Implementation and testing phases. Data Structures, Abstract Data Types, File Structures. Data Bases – Architecture, Models, Relationalmodel, Basics of Data base design. **(9 Hours)**

UNIT V   Data Compression – Loss less compression, lossy compression. Computer Security – Confidentiality - Symmetric Key, Asymmetric key cryptography , Other aspects of Security. Artificial Intelligence – Introduction, Knowledge Representation, Neural Networks. **(8 Hours)**

TEXT BOOK

Behrouz A. Forouzan, FirouzMosharraf, "Foundations of Computer Science", 3[rd]Ed, Thomson Learning, 2014.

REFERENCES

1. V.Rajaraman and NeeharikaAdabala, "Fundamentals of Computers", 6[th]ed, PHI Learning private limited, 2015

2. ReemaThareja, "Fundamentals of Computers" 1[st]ed, Oxford University press, 2014

3. Pradeep K Sinha and Priti Sinha, "Computer Fundamentals", 6[th]ed, BPB publications, 2004

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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, mainfunction, functionparameters,return value, Recursion, Comparison of Iteration and recursion.
Scope and Extend
Arraysandstrings-Introduction**,**   Multi-dimensionalarrays,strings,arraysofstrings, 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. YashavantKanetkar , 'Let Us C', BPB Pulication. 6th Ed. 2005
3. Byron Gottfried, 'Programming with C', 2nd Ed. Schaim'souline series, 2002.
4. Les Hancock and Morris Krieger, 'The C Primer', McGraw-Hill, 1987

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CAS 2103 COMPUTER ORGANIZATION
(June 2016 Revision)

UNIT I   Basic Structure of Computers – Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multicomputers. Number System-Binary Number System, Octal Number System , Hexadecimal Number System, Binary Arithmetic, Binary Coded decimal, Alpha Numeric Codes – ASCII, ISCII and EBCDIC Codes.   **(12 Hours)**

UNIT II   Machine Instructions and programs – Memory locations and addresses, Memory operations, Addressing modes, Basic I/O operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions. Input-Output organization – Accessing I/O devices, Interrupts, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.   **(12 Hours)**

UNIT III   The Memory System – Some Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Cache Memories, Virtual Memories, Memory Management Requirements. Arithmetic- Addition and Subtraction of signed numbers, Multiplication of positive numbers, Signed Operand Multiplication, Integer division, Floating point numbers and Operations.   **(12 Hours)**

UNIT IV   Boolean Algebra, Logic Gates, Combinational and sequential circuits. Logic circuits - Basic Logic Functions, Synthesis of logic functions, Minimization of logic, Synthesis with NAND and NOR Gates, Flip-Flops, Register, Shift Register, Counters, Decoders, Multiplexer. Basic processing Unit – Fundamental Concepts, Execution of a complete instruction, Multiple-bus organization, Hardwired control, Microprogrammed control.   **(15 Hours)**

UNIT V   Pipelining – Basic concepts, Data hazards, Instruction Hazards, Influence on instruction sets, superscalar Operation, Datapath and control consideration. Superscalar operations.   **(9 Hours)**

TEXT BOOKS

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, 'Computer Organization'. 5th Ed. Tata McGraw-Hill, 2011.
2. Manish Saraswat, 'Computer Architecture And Organisation', 1st Ed. Vayu Education of INDIA, 2011.

REFERENCES

1. Tanenbaum A.S, 'Structured Computer Organization'. 5/e, Prentice Hall of India 2006
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
(June 2016 Revision)

UNIT I   Introduction to SIC Machine architecture, **Assemblers:-** Basic Assembler Functions – Assembler Algorithm and Data Structures, Machine-Dependent Assembler Features – Instruction formats, addressing modes, relocation, Machine-Independent Assembler Features – Literals, Symbol defining statements, expressions, program blocks, control section and program linking Assembler DesignOptions–onepassassembler,multipassassembler.   **(12 Hours)**

UNIT II   **Loaders and Linkers:** - Basic Loader Functions – Absolute Loader, Boot strap loader, Relocation, Program Linking. Linking Loader – Algorithm, Data Structures.   **(8 Hours)**

UNIT III   Machine-Independent Loader Features – Automatic Library search, Loader Options, Loader Design Options – Linkage Editor, Dynamic Linking
Macro Processors: - Macro Definition and Expansion, Macro Processor Algorithm and Data Structures, Machine-Independent Macro Processor Features.   **(10 Hours)**

UNIT IV   **Compilers:** - Basic Compiler Functions – Grammars, Lexical Analysis, Syntactic Analysis, Code Generation., Machine-Dependent Compiler Features – Intermediate code Generation, Machine dependent code optimization.   **(8 Hours)**

UNIT V   Machine-Independent Compiler Features – Structured variable,Machine independent code optimization, Storage allocation, Block Structured languages. Compiler Design Options – Interpreters, P-Code compilers, Compiler Compilers.
Operating systems:-Basic Operating System Functions.   **(7 Hours)**

TEXT BOOK

Leland L.Beck, D Manjula: "**System Software An introduction to System Programming**" 3 rd Edition; 7th Impression, Pearson, 2010.

REFERENCES

1. Donovan J.J: Systems Programming Mc Graw Hill, 2002.

2. Dhamdhere D.M: Introduction to System Software. Tata Mc Graw Hill Pub. Co, 2011.

3. J Nithyashri, "System Software", 2nd Edition, Tata Mc Graw Hill, 2010

4. A.A Puntambekar, I A Dhotre, "System Software",Technical Publication, 2007.

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CAS 2105 DISCRETE STRUCTURES AND GRAPH THEORY
(June 2016 Revision)

UNIT I   Sets - sub-sets, operations on sets, Algebraic properties of set operations. The addition principles – Propositions and Logical operations, Logical connectives and compound statements, Conditional statements.   **(9 Hours)**

UNIT II   Product sets – partitions, relations and digraphs, sets arising from relations, matrix of a relation, digraph of a relation, paths in relations and digraphs, properties of relations – Reflexive and Irreflexive relations, Symmetric, Asymmetric and Anti Symmetric relations, Transitive relations, Equivalence relations and partitions   **(10 Hours)**

UNIT III   Partial ordered sets – Hasse diagrams, Topological sorting, Isomorphism, External elements of partially ordered sets. Lattices - Isomorphic lattices, properties of lattices, special types of lattices. Finite Boolean algebra – Functions on Boolean Algebra, Boolean polynomials.   **(10 Hours)**

UNIT IV   Graphs – Sub Graphs and Quotient graphs. Euler paths and circuits, Fleury's algorithm, Hamiltonian paths and circuits. Transport networks – Maximum flow, labeling algorithm, Max Flow Min Cut Theorem. Graph coloring, Chromatic number, Chromatic polynomials.   **(9 Hours)**

UNIT V   Binary Operations – Properties of Binary operations, Groups ,Semi Groups , Isomorphism and Homomorphism, Rings and Fields.   **(7 Hours)**

TEXT BOOK

Bernard Kolman, RobertBusby and Sharon Cutler Ross, "**Discrete Mathematical Structures for Computer Science**", 6th Ed, PHI , 2013.

REFERNCES

1. Rings, Fields and Groups: An Introduction to Abstract Algebra (2nd Ed): RegAllenby , 2013.
2. First look at graph theory (1st Ed): John Clark & Derek Allan Holton, Allied Publishers (1995)
3. Elements of Discrete Mathematics (1st Ed): L CL Liu, McGraw-Hill (2005)
4. Discrete Computational Structures (2nd Ed): Robert R. Korfhage, Academic Press (1984).
5. Graph Theory with Applications to Engineering & Computer Science: NarsinghDeo, PHI (2014).

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CAS 2201 DATABASE MANAGEMENT SYSTEMS
(June 2016 Revision)

UNIT I   Introduction to File and Database systems- History- Advantages, disadvantages- Data views – Database Languages – DBA – Database Architecture – Data Models - Keys – Mapping Cardinalities **(10 Hours)**

UNIT II   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. **(12 Hours)**

UNIT III   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. **(15 Hours)**

UNIT IV   Transaction concept – state- Serializability – Recoverability- Concurrency Control – Locks- Two Phase locking – Deadlock handling – Transaction Management in Multidatabases. **(13 Hours)**

UNIT V   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. Introduction to MongoDB , Overview of NoSQL. **(10 Hours)**

TEXT BOOK

1. Abraham Silberschatz, Henry F. Korth and ASudarshan, '**Database System Concepts"**. 6th Ed., McGraw Hill International Edition, 2010.

REFERENCES

1. Philip J. Pratt, Joseph J Adamski, '**Database MnagementSstems**', Cengage Learning, 2009
2. RameezElmasri, Shamkant B. Navathe, '**Fundamentals of DtabaseSytems**', 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. Kristina Chodorow, "**MongoDB: The Definitive Guide", 2nd Edition, O'Relly,** 2013
7. Guy Harrison, "**Next Generation Data Bases – NoSQL, NewSQL and Big Data**", 1stEd ,Apress, 2015.

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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

 K R Venugopal, Rajkumar Buyya, "Mastering C++", Tata Mc Graw Hill, 2013.

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
(June 2016 Revision)

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.   **(12 Hours)**

UNIT II **CPU Scheduling:** Basic concepts, Scheduling criteria, scheduling algorithms, Multiple processor scheduling, Real time scheduling, **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.   **(12 Hours)**

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 Protection.   **(8 Hours)**

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.   **(7 Hours)**

UNIT V **Protection:** Goalsof 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.   **(6 Hours)**

TEXT BOOK

Silberschatz, Galvin, Gagne, "Operating System Concepts", 9th Ed, Wiley-India, 2012.

REFERENCES

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

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

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CAS 2204 DATA STRUCTURES & ALGORITHMS
(June 2016 Revision)

UNIT I   Introduction – Algorithm and Specification, Data Abstraction, Performance analysis – Space Complexity, Time Complexity. **Arrays –** Introduction, Dynamically allocated arrays,sparse matrices, Representation of Multidimensional arrays **(6 Hours)**

UNIT II   Stack – Definition and Operations, Applications of Stack, Recursion, Backtracking. Conversion of infix to postfix – Evaluation of postfix expression. Queue - Definition and Operations, Circular Queue, Dqueue – Implementation, Priority Queue. Linked lists – singly, doubly and circular lists, Application of linked lists, Polynomial manipulation **(10 Hours)**

UNIT III   Trees – Terminology and representation, Binary trees – Binary tree traversals – pre-order, in-order & post-order. Binary Search Trees – Insertion, Deletion and Search. **(7 Hours)**

UNIT IV   Graph – Graph representation, Adjacency matrices, Adjacency Lists, Graph traversal – DFS,BFS, Shortest path– Dijkstra's algorithm, Minimum spanning tree - Kruskal Algorithm, prims algorithm. **(12 Hours)**

UNIT V   Searching - Linear Search, Binary Search and Fibanocci Search. Sorting – Selection sort, Bubble sort, Insertion sort, Quick sort, Merge sort, Count sort, Radix sort, Bucket sort, Introduction to external sorting. **(10 Hours)**

TEXT BOOK

Ellis Horowitz. SartajSahni and Anderson Freed, 'Fundamentals of Data Structures in C'', 2nd Ed, Universities Press, 2008

REFERENCES

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Benjamin/Cummings Publishing Company Inc., Redwood City, CA, 1991
2. Aaron M.Tanenbaum, Moshe J.Augenstein, "Data Structures using C", Prentice Hall International Inc., Englewood Cliffs, NJ, 1986

3. Aaron M Tanenbaum, YedidyahLangsam, Moshe J Augenstein, "Data Structures using C", Prentice Hall International, Inc, 2009

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CAS 2301 ADVANCED DATA STRUCTURES AND ALGORITHMS

(June 2016 Revision)

UNIT I   Role of Algorithms in Computing, Analyzing and Designing Algorithms, Asymptotic notations, Standard notations and common functions. Divide and Conquer - Strassen's algorithm for matrix multiplication, The substitution method for solving recurrences, The recursion-treemethodforsolvingrecurrences. **(8 Hours)**

UNIT II   Probabilistic Analysis and Randomized Algorithms - The hiring problem,Indicator random variables, Randomized algorithms.Heapsort - Heaps, Maintaining the heap property, Building a heap, The heapsort algorithm, Priority queues. **(8 Hours)**

UNIT III   Hash Tables - Direct-address tables, Hash tables,Hash functions,Open addressing, Perfect hashing. Red-Black Trees - Properties of red-black trees, Rotations Insertion,Deletion. Dynamic Programming - Rod cutting, Elements of dynamic programming, Longest common subsequence. **(10 Hours)**

UNIT IV   Greedy Algorithms - An activity-selection problem, Elements of the greedy strategy,Huffman codes. B-Trees - Definition of B-trees,Basic operations on B-trees. Fibonacci Heaps, Structure of Fibonacci heaps, Mergeable-heap operations. **(10 Hours)**

UNIT V   Single-Source Shortest Paths - The Bellman-Ford algorithm. All-Pairs Shortest Paths -The Floyd-Warshall algorithm. Maximum Flow - Flow networks, The Ford-Fulkerson method, Maximum bipartite matching. NP-Completeness - Polynomial time,Polynomial-time verification, NP-completeness and reducibility, NP-complete problems. **(9 Hours)**

TEXT BOOK

Thomas H Cormen, Charles E Leiserson, Ronald L Rivest,. Clifford Stein, "Introduction to Algorithms", 3 Ed, MIT Press 2009.

REFERENCES

1. Ellis Horowitz. SartajSahni and Anderson Freed, 'Fundamentals of Data Structures in C", 2nd Ed, Universities Press, 2008.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Benjamin/CummingsPublishing Company Inc., Redwood City, CA, 1991.
3. Aaron M.Tanenbaum, Moshe J.Augenstein, "Data Structures using C", Prentice Hall InternationalInc., Englewood Cliffs, NJ, 1986.
4. Aaron M Tanenbaum, YedidyahLangsam, Moshe J Augenstein, "Data Structures using C", Prentice Hall International, Inc, 2009.

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CAS 2302 COMPUTER GRAPHICS
(June 2016 Revision)

UNIT I   Introduction - Graphs and Charts ,Computer-Aided Design ,Virtual-Reality Environments , Data Visualizations , Education and Training , Computer Art ,Entertainment, Image Processing, Graphical User Interfaces, Computer Graphics Hardware - Video Display Devices, Raster-Scan Systems, Graphics Workstations and Viewing Systems, Computer Graphics Software - Coordinate Representations, Graphics Functions ,Software Standards Introduction to OpenGL.   **(6 Hours)**

UNIT II   Graphics Output Primitives - Coordinate Reference Frames, Specifying A Two-Dimensional World-Coordinate Reference Frame in OpenGL , OpenGL Point Functions , OpenGL Line Functions, OpenGL Curve Functions, Fill-Area Primitives , Polygon Fill Areas OpenGL Polygon Fill-Area Functions, OpenGL Vertex Arrays ,Pixel-Array Primitives, OpenGL Pixel-Array Functions, Character Primitives , OpenGL Character Functions ,Picture Partitioning , OpenGL Display Lists , OpenGL Display-Window Reshape Function.   Attributes of Graphics Primitives.   **(12 Hours)**

UNIT III   Implementation Algorithms for Graphics Primitives and Attributes - Line-Drawing Algorithms, Parallel Line Algorithms, Setting Frame-Buffer Values, Circle-Generating Algorithms,   Ellipse-Generating   Algorithms,   Conic   Sections, Polynomials and Spline Curves, Parallel Curve Algorithms, Pixel Addressing and Object Geometry, Fill Methods for Areas with Irregular Boundaries, Two-Dimensional Geometric Transformations - Basic Two-Dimensional Geometric Transformations, Matrix Representations, Homogeneous Coordinates, Inverse Transformations, Two-Dimensional Composite Transformations, Raster Methods for Geometric Transformations , OpenGL Raster Transformations.   **(14 Hours)**

UNIT IV   OpenGL Two-Dimensional Viewing Functions, Three –Dimensional Geometric and modeling transformations and viewing: Translation, Rotation, Scaling. Modeling and coordinate transformations, Viewing Pipeline, Viewing Coordinates, Projections, Viewing volumes and general projection transformations, Clipping, Visible Surface-detection methods, OpenGL   Geometric-Transformation   Functions.   Three-Dimensional   Geometric Transformations, Three-Dimensional Viewing.   **(8 Hours)**

UNIT V   Computer Animation **-** Raster Methods for Computer Animation, Double Buffering, Generating Animations Using Raster Operations, Design of Animation Sequences, Traditional Animation Techniques, General Computer-Animation Functions Computer - Animation Languages, Key-Frame Systems, Morphing, Simulating Accelerations, Motion Specifications, Direct Motion Specification, Goal-Directed Systems, Kinematics and Dynamics, Character Animation, Articulated Figure Animation, Motion Capture, Periodic Motions, OpenGL Animation Procedures.   **(5 Hours)**

TEXT BOOK

   Hearn, Donald and Baker, M Pauline, 'Computer Graphics with open GL'.4th Ed., Pearson, 2011.

REFERENCES

   1. Edward Angel, "Interactive Computer Graphics: A top down approach using Open GL", 5th Edition, Pearson, 2012.
   2. Hill F S, Kelley S M "Computer Graphics using Open GL", 3rd Edition, Pearson, 2015.

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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
(June 2016 Revision)

UNIT I   Introduction, Uses of Computer Networks, Network Hardware, Network Software, Reference Models, Example Networks. The Physical Layer - The Theoretical Basis For Data Communication, Guided Transmission Media, Wireless Transmission, Communication Satellites, Public Switched Telephone Network.   **(12 Hours)**

UNIT II   The 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, RFID, Data Link Layer Switching.   **(12 Hours)**

UNIT III   The Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality Of Service, Internetworking, The Network Layer in the Internet.   **(12 Hours)**

UNIT IV   The Transport Service, Elements of Transport Protocols, congestion control, The Internet Transport Protocols (TCP & UDP).   **(12 Hours)**

UNIT V   The Application Layer - DNS – Domain Name System, Electronic Mail, the World Wide Web, Streaming – Audio and Video. Network Security: Cryptography, Symmetric-Key Algorithms, Public-Key Algorithms, Digital Signatures.   **(12 Hours)**

TEXTBOOK

Andrew S Tanenbaum, David J Whetherall ,” Computer Networks”, Fifth Edition, Pearson Education 2011.

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
(June 2016 Revision)

UNIT I   Kinds of Errors in Numerical Procedures, Solving Nonlinear Equations: Interval Halving (Bisection), Linear Interpolation Methods, Newton's Method, Fixed-Point Iteration:x=g(x) Method, Newton's method for polynomials. **(10 Hours)**

UNIT II   Solving System of Equations: Matrices and Vectors, Elimination Methods, The Inverse of a Matrix, Matrix Norms, Condition Number, Relaxations method, Iterative Methods – Jacobi Method, Gauss Seidel Method. **(10 Hours)**

UNIT III   Interpolation and Curve Fitting: Interpolating Polynomials, Lagrangram Polynomials, Divided Differences, Least-Squares Approximations. **(10 Hours)**

UNIT IV   Numerical Differentiation and Integration: Getting Derivatives,Numerical Integration – The Trapezoidal Rule, Simpson's Rules, Composite formula, Multiple Integrals – Simpson's rule, Trapezoidal rule. **(8 Hours)**

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. **(7 Hours)**

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 6thEdn., New Age International Publishers, 2012.

2. Numerical Methods: for engineering and Science, Rajesh Srivastava, Publisher: Oxford University Press (2010)

3. Computer Oriented Numerical Methods, Rajaraman V, PHI, 3rdEdn. 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

TEXTBOOKS

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

REFERENCES

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

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CAS 2221 NUMBER THEORY

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

UNIT 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 BOOKS

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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CAS 2222 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. WhinstonISE -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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CAS 2223 MULTIMEDIA SYSTEM 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 BOOK

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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CAS 2224 DIGITAL ELECTRONICS
(JANUARY 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, ThomsonLearning,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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CAS 2331 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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CAS 2332 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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CAS 2333 JAVA PROGRAMMING
(June 2016 Revision)

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, Arrays. Objects Classes and Inheritance, Interfaces: Object cloning, Interfaces and call backs. Inner classes: local, Anonymous and static Inner classes.   **(10 Hours)**

UNIT II   Swing programming: the model-view-controller design pattern, Introduction to layout management, Text Input, Choice components, Menus and Dialog Boxes. Basic event handling, Applets.   **(8 Hours)**

UNIT III   Exception handling basics, Threads: Thread states, Thread creation, Thread properties, Synchronization. Streams and Files: Streams, Text Input and Output, Random Access Files, Object Streams and serialization, File Management.
(10 Hours)

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, JDBC configuration, executing SQL statements, Scrollable and Updatable Result sets, Row sets, Transactions**.**
(10 Hours)

UNIT V   Java Beans: creating beans, Using Beans to build an application, Naming patterns for Bean property types, BeanInfo classes, Property editors, Customizers, Java Bean Persistence.   **(7 Hours)**

TEXT BOOK

Horstmann and Coronell ,"Core Java -, Volume 1 and 2" , 10th Ed, Pearson, 2016

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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CAS 2334 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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CAS 2335 OPERATIONS RESEARCH
(June 2016 Revision)

UNIT I   Linear programming - Mathematical Model, assumptions of linear programming, Solutions of linear programming problems – Graphical Method, Simplex method, Artificial Variable Methods - Two phase Method, Big M Method. Duality, Dual simplex method. **(10 Hours)**

UNIT II   Special types of Linear programming problems- Transportation Problem – Mathematical formulation of Transportation Problem, Basic feasible solution in TP, Degeneracy in TP, Initial basic feasible solutions to TP, Matrix Minima Method, Row Minima Method, Column Minima Method, Vogel's Approximation Method, Optimal Solution to TP - MODI Method, Stepping Stone Method, Assignment problems – Definition, Mathematical Model - Hungarian Method. **(10 Hours)**

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. **(10 Hours)**

UNIT IV   Dynamic programming, Properties of Dynamic programming, Bellman's Principle of Optimality, Deterministic and Probabilistic Dynamic programming. Linear programming by dynamic programming approach. **(7 Hours)**

UNIT V   Queuing Model: Elements and Characteristics of queuing systems, Classification of queuing systems –Structures of Basic Queuing System, Definition and classification of stochastic processes- discrete- time Markov Chains – Continuous Markov Chains-
The classical system-Poisson Queuing Sysetm – M/M/1: ∞/FIFO, M/M/1: ∞/SIRO Birth Death Process, Pure Birth system, Pure Death system. **(8 Hours)**

TEXT BOOK

JK Sharma, "Operations Research – Theory and Applications ", 4th Ed, Mc Millan Publishing, 2009

REFERENCES

1. Hamdy A Taha, 'Operations Research', 9th Ed., Mc Millan Publishing Company, 2010
2. Kantiswaroop, PK Guptha, Manmohan,"Operation Research", 13th Ed, Sulthan Chand & Sons 2007.
3. Ronald L Rardin, 'Optimisation in Operation Research', 2nd Ed., 2016.
4. Mc Millan Claude Jr, 'Mathematical Programming', 2nd Ed. Wiley Series, 1979.
5. Srinath L.S, 'Linear Programming', East-West, New Delhi.
6. Gillet B G, 'Introduction to Operation Research: a computer oriented algorithmic approach', Mc Graw Hill Book Comp. 1976.

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CAS 2441 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, 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.

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, Templatecontent. 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, Datatables, 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- SubrahmanyamAllamaraju and Cedric Buest- Apress publication, 2007.
2. Core JavaServer Faces-Second Edition-David Geary,CayHorstmann-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- VivekChopra,JonEaves,Rubertjones,SingLi,JohnT.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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CAS 2442 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,J SP 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- SubrahmanyamAllamaraju 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- VivekChopra,JonEaves,Rubertjones,SingLi,JohnT.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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CAS 2443 PRINCIPLES OF PROGRAMING LANGUAGES
(Jan 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-Named Constants - 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 BOOKS

1. Robert W. Sebesta,"**Concepts of Programming Languages**" Addison-Wesley; 10th edition, 2012
2. RaviSethi, "Programming Languages-concepts and constructs", Addison Wesley, 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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CAS 2444 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- SubrahmanyamAllamaraju 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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CAS 2445 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 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.

TEXTBOOK

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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CAS 2446 ANDROID APPLICATION PROGRAMMING
(Revised January 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-MengLee,”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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CAS 2447 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 instance of 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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CAS 2448 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- Transportations - 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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CAS2449 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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CAS 2561 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.

TEXTBOOKS

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.

REFERENCES
1. Software Project Management- A unified framework by Walker Royce, Pearson Education, 2003.
2 Software Engineering-a Practitioner's approach by Roger S Pressman, Sixth Edition, Tata McGraw-Hill 2004.
3. Software Management By Donald J Reifer, Sixth Edition, Wiley-IEEE Computer Society Press, 2002.

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CAS 2462 INTELLIGENT SYSTEMS
(Revised July 2016)

UNIT I   Introduction to knowledge based intelligent systems. Rule based expert systems-Rules as Knowledge representation techniques, Structure of Rule Based System, Expert System, Forward and Backward Chaining, Conflict Resolution. Uncertainty Management in Rule based Systems- Probability Theory, Bayesian Reasoning.

UNIT II   Fuzzy Expert systems-Fussy sets, Linguistic variables and hedges, operations of fuzzy sets, fuzzy rules and inference, building a fuzzy expert system. Frame Based Expert Systems-frames as Knowledge representation technique, Inheritance, Methods and demons, Interaction of frames and rules. Artificial Neural Networks-Introduction, Neuron, Perceptron, Multilayer Neural Networks, Accelerated Learning, Hop field network, Bidirectional Associative Memory, Self organizing Neural Networks

UNIT III   Evolutionary Computation- Introduction, Genetic Algorithms, evolution strategies, genetic programming.

UNIT IV   Hybrid Intelligent Systems- Introduction, Neural Expert System, Neuro fuzzy Systems, Adaptive Neuro Fuzzy Inference Systems, Evolutionary Neural Networks, Fuzzy Evolutionary Systems.

UNIT V   Knowledge Engineering, Data Mining and Knowledge Discovery – Introduction, Statistical Methods and data visualization, principal component analysis, Decision trees.

TEXTBOOK

Michael Negnevitsky, Artificial Intelligence: A Guide to Intelligent Systems, 3/E – 2011, Pearson

REFERENCES

1. Artificial intelligence and Intelligent Systems, N. P. Padhy, Oxford University Press, 2007

2. Intelligent Systems: Alexander m Maystal& James S Albus, John Wiley, 2002

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CAS 2563 DIGITAL IMAGE PROCESSING
(Revised July 2016)

UNIT I   Introduction, Digital Image Fundamentals: elements of visual perception, light electromagnetic spectrum, image sensing and acquisition, image sampling quantization, some basic relationship between pixels. Intensity Transformations: Ba of intensity transformations, some basic intensity transformation functions, histog 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 n linear-positive invariant degradations, inverse filtering, Wiener filtering, constra least square filtering, geometric mean filter.

UNIT IV   Image Compression: fundamentals, basic compression methods.
Morphological Image Processing: preliminaries, erosion and dilation, opening and closing, basic morphological algorithms.

UNIT V   Image Segmentation: fundamentals, point, line and edge detection, thresholding, re 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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CAS 2564 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 BartoszPorebski, Karol Przystalski, Leszek Nowak published 2011 by Wiley India.

REFERNCES

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

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CAS 2565 ARTIFICIAL INTELLIGENCE
(Revised – July 2016)

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. Informed Search Strategies – Heuristic function

UNIT II   Local search algorithms and optimisation problems – Local search in continuous spaces – Searching with non-deterministic Actions-Searching with Partial observations-Online search agents and unknown environments –Adversarial Search – Games – Optimal decisions in games –Alpha – Beta Pruning – imperfect real-time decision – Games that include an element of chance. Constraint satisfaction problems (CSP) – Backtracking search and Local search – Structure of problems**.**

UNIT III   Logical Agents-Knowledge based Agents, The Wumpus world, Logic, Propositional Logic, 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 in FOL. Inference – Prepositional versus first order logic – Unification and lifting – Forward chaining – Backward chaining –Resolution

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

UNIT V   Learning From Observations – forms of learning – Inductive learning -Learning decision trees – Ensemble learning

TEXT BOOK

Stuart Russell, Peter Norvig, 'Artificial Intelligence – A Modern Approach', 3rd Ed., Pearson Education, 2015.

REFERENCES

1. Nils J. Nilsson, 'Artificial Intelligence: A new Synthesis', Elsevier, 2000.
2. Elaine Rich & Kevin Knight, 'Artificial Intelligence', 3rd Ed., Tata McGraw Hill, 2009.

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CAS 2566 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, EibeFrank,Morgan Kaufmann June 2005.

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

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CAS 2567 THEORY OF COMPUTATION
(January 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 NarosaPublucation

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CAS 2568 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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CAS 2569-WIRELESS SECURITY

(June 2016 Revision)

UNIT I: Security Attacks- Interruption, Interception, Modification, Fabrication. Security Services – Confidentiality, Authentication, Integrity, Non Repudiation, Access Control, Availability. Security Mechanisms. Model for network Security, Buffer Overflow, TCP Session Hijacking, ARP Attacks, Route Table Modification, UDP Hijacking, Man in the Middle attack. **(10 Hours)**

UNIT II Wireless Application Protocol, Comparison – TCP/IP, OSI and WAP Models, How WAP works, Security status of WAP – Viruses, Authorization, Non Repudiation, Authentication, Secure Sessions. WAP Security Architecture, Marginal Security – Wireless access to the internet, Wireless middleware. **(12 Hours)**

UNIT III Block Ciphers and Stream Ciphers, Block Cipher modes of Operations, RC4 Encryption. WEP Security, Cracking WEP, Securing Wireless LAN. **(8 Hours)**

UNIT IV RFID – Application types, RFID System components – Tag, Reader, Middleware, Attaching RFID tags, Tracking the movements of items. Architecture Guide lines, System Management. **(8 Hours)**

UNIT V Wireless Hacking Techniques, Wireless attacks, mobile Security, Securing Wi-Fi. **(7 Hours)**

TEXT BOOKS

1. Tyler Wrightson, "Hacking exposed Wireless Network Security A Beginner's Guide ", 1st Edition, Tata Mc – Graw Hill, 2012.
2. Bill Glover, Himanshu Bhatt, "RFID Essentials", 2nd Edition, Oreilly, 2007.

REFERENCES

1. William Stallings ,"Cryptography and Network Security Principles and Practice ", Sixth Edition , Pearson, 2014.
2. Shiva Sukula, RFID essentials , innovations and beyond, ESS, 2012.

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CAS 2570 NATURAL LANGUAGE PROCESSING

UNIT I   Introduction: Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms, Language, Thought, and Understanding, The State of the Art, Regular Expressions and Automata: Regular Expressions, Finite-State Automata, Regular Languages and FSAs.

UNIT II   Morphology and Finite-State Transducers: Survey of English Morphology, Finite-State Morphological Parsing, Combining FST Lexicon and Rules, Lexicon-Free FSTs - The Porter Stemmer, Human Morphological Processing, N-grams: Counting Words in Corpora, Simple N-grams, Smoothing, Backoff, Deleted Interpolation, N-grams for spelling and Pronunciation, Entropy.

UNIT III   Word Classes and POS Tagging: English Word Class, Tagsets for English, POS Tagging, Rule-Based POS tagging, Stochastic POS Tagging, Transformation Based Tagging, Context-Free Grammars for English: Constituency, Context-Free Rules and Trees, Sentence-Level Constructions, The Noun Phrase, Coordination, Agreement, The Verb Phrase and Subcategorization, Auxiliaries, Parsing with Context-Free Grammars: Parsing as Search, Probabilistic Context-Free Grammars.

UNIT IV   Representing Meaning: Computational Desiderata for Representations, Meaning Structure of Language, First Order Predicate Calculus, Some Linguistically Relevant Concepts, Semantic Analysis: Syntax-Driven Semantic Analysis, Attachments for a Fragment of English, Lexical Semantics: Relations Among Lexemes and their senses, WordNet.

UNIT V   Discourse: Reference Resolution, Text Coherence, Discourse Structure, Natural Language Generation: Introduction to Natural Language Generation, An Architecture for Generation, Surface Realization, Discourse Planning, Machine Translation: Language Similarities and Differences, The Transfer Metaphor, The Interlingua Idea-Using Meaning, Direct Translation, Using Statistical Techniques.

TEXT BOOK

Daniel Jurafsky and James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Pearson, Second Impression, 2009

REFERENCES

Allen, James, "Natural Language Understanding", Pearson, First Impression, 2007.

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CAS 2571-OBJECT ORIENTED SOFTWARE ENGINEERING
(June 2016 Revision)

UNIT I: Introduction to Software Engineering - Modeling, Problem Solving, Knowledge Acquisition, Rationale. Software Engineering Concepts, Software Engineering Development Activities, Managing Software Development, Software Life Cycle. Modeling with UML – An Overview of UML, Modeling Concepts, Deeper view into UML. **(10 Hours)**

UNIT II: Object Design - Reusing Pattern Solutions, An Overview of Object Design, Reuse Concepts: Solution Objects, Inheritance, and Design Patterns, Reuse Activities: Selecting Design Patterns and Components, Managing Reuse. An Overview of Interface Specification, Interface Specification Concepts, Interface Specification Activities, Managing Object Design. **(8 Hours)**

UNIT III: Mapping models to code - An Overview of Mapping, Mapping Concepts, Mapping Activities, and Managing Implementation. Managing Testing. Rationale Management – Rationale Concepts. **(10 Hours)**

UNIT IV: Configuration Management – Concepts, Activities, Managing Configuration management. Project Management – Concepts, Classical project management activities, Agile project management activities. **(9 Hours)**

UNIT V: Software Life Cycle - IEEE 1074 Life Cycle Processes, Life cycle models. Methodology Issues, Spectrum of Methodologies. Case studies. **(8 Hours)**

TEXT BOOK

Bernd Bruegge & Allen H. Dutoit, "Object-Oriented Software Engineering Using UML, Patterns, and Java™", Third Edition, Pearson, 2014.

REFERENCES

David Kung, "Object-Oriented Software Engineering: An Agile Unified Methodology" , 1st Edition, 2013.

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CAS 2572-SECURE SOFTWARE ENGINEERING
(June 2016 Revision)

UNIT I: Introduction to software security – Reliability and security, Penetrate and patch, Security Goals – Prevention, traceability and auditing, monitoring, privacy and confidentiality, multi-level security, anonymity, authentication, integrity. Software Security Risks – Role of security personnel, security personnel life cycle. Deriving requirements, risk assessment, design for security, implementation, security testing. **(10 Hours)**

UNIT II: Selecting technologies – Language – CORBA, DCOM, EJB and RMI, Operating System, Authentication technologies, Security by obscurity, Reverse Engineering, code obfuscation. Security for shrink wrapped software. **(8 Hours)**

UNIT III: Guiding principles for software security, Auditing Software – Architectural security analysis, attack trees, reporting analysis findings, implementing security analysis, auditing source code, source level security auditing tools – RATS, effectiveness of secure scanning of software. **(10 Hours)**

UNIT IV: Access Control – UNIX access control model. Race Conditions. Cryptography – general recommendations. Trust Management and input validations – Introduction, protection from hostile callers, invoking other programs safely, problems from the web, client side security. **(9 Hours)**

UNIT V: Incorporating SSD with SDLC – incident response plan, final security review, Review and react, integration tools. Secure delivery methods, security policy in Organization, Zero day and Beyond. **(8 Hours)**

TEXT BOOKS

1. John Viega , Gary McGraw " Building Secure Software: How to Avoid Security Problems the Right Way", Addison Wesley, 2013.
2. Theodor Richardson , Charles N Thies, "Secure Software Design", 1st Edition, Ascend learning company, 2013.

REFERENCES

1. Eduardo Fernandez-Buglioni, "Security Patterns in Practice: Designing Secure Architectures using software Patterns", Ist Edition, 2013
2. JAN Etal JURJENS, "Engineering Secure Software and Systems", Ist Edition, 2014.

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CAS 2573 SECURITY THREATS AND VULNERABILITIES
(June 2016 Revision)

UNIT I: OSI Security architecture – Security Attacks, Services and Mechanisms. Model for network Security – Open and Closed Security models. Security Goals, Identifying potential risks to Network security Simplified DES, Simplified AES.   **(8 Hours)**

UNIT II   Threat, Types of Threat, Vulnerabilities, Controls and Counter measures, . Attacks examples – Reconnaissance attack, Access attacks, Masquerading, IP Spoofing, Denial of Service attack, Distributed Denial of Service, Salami Techniques, Botnets, Onion Routing.   **(8 Hours)**

UNIT III   Entity authentication – Password, Challenge/ Response, Zero Knowledge Protocol. Biometrics, Introduction to identity based Public Key Cryptography, Oblivious transfers. Legal and Ethical issues, Cybercrime and computer crime, Intellectual Property Management – Copyright, Patent and Trade Secret, Digital Right Management.   **(10 Hours)**

UNIT IV   Intruders, Hackers, Intrusion Techniques – Password Guessing, Password Capture. Intrusion Detection Systems- Types, Honeypots. Malicious Softwares - Virus and Types of Virus, Countermeasures, Worms, Trojan Horse , Trap door, Logic Bomb. Firewalls – Characteristics, Types – Packet filters, Application level gateways, Circuit level gateways, Baston host, Personal firewalls.   **(10 Hours)**

UNIT V   Email attacks – SPAM , Electronic Mail Security - PGP, S/MIME, Kryptoknight, Smart cards, SET, Clipper, ISO Authentication framework.   **(9 Hours)**

TEXT BOOKS

1. William Stallings ,"Cryptography and Network Security Principles and Practice ", Sixth Edition , Pearson, 2014.
2. Behrouz A Forouzan , "Cryptography & Network Security , Second Edition, McGraw-Hill, 2007.

REFERENCE

Charles P Fleeger, Shari Lawerence P Fleeger, Jonathan Margulies, "Security in Computing" Fifth Edition, Prentice Hall, 2015.

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CAS 2574 SOFTWARE TESTING
(Revised July 2016)

UNIT I   **A brief history of Software Testing –** Historical Software Testing and development parallels, Extreme Programming, evolution of automated testing tools. **Overview of Testing Techniques-** Black-Box Testing, White-Box Testing, Gray-Box Testing, Manual versus Automated Testing, Static versus Dynamic Testing, Taxonomy of Software Testing Techniques.

UNIT II   **Transforming Requirements to Testable Test Cases**- Introduction, Software Requirements as the Basis of Testing, Requirement Quality Factors, Numerical Method for Evaluating Requirement Quality, Process for Creating Test Cases from Good Requirements, Transforming Use Cases to Test Cases, What to Do When Requirements Are Nonexistent or Poor- Ad Hoc Testing, Exploratory Testing

UNIT III   **Emerging Specialized areas in testing -** Test Process and Automation Assessment –Test Process Assessment, Test Automation Assessment, Test Automation Framework- Basic Features of an Automation Framework, Standard Automation Frameworks, Keyword-Driven Framework, Hybrid Framework.

UNIT IV   **Emerging Specialized areas in testing – (continued) Nonfunctional Testing** - Performance Testing, Stress Testing, Performance Monitoring, Performance Testing Approach, Knowledge Acquisition Process, Test Development, Performance Deliverables, Security Testing, Types of Security Testing, Usability Testing, Goals of Usability Testing, Compliance Testing

UNIT V   **Modern Software Testing Tools -** Software Testing Trends, Automated Capture/Replay Testing Tools, Test Case Builder Tools, Necessary and Sufficient Conditions, **Taxonomy of Software Testing Tools**- Testing Tool Selection Checklist, Commercial Vendor Tool Descriptions, Open-Source Freeware Vendor Tools, When You Should Consider Test Automation, When You Should NOT Consider Test Automation

TEXT BOOK

Software Testing and Continuous Quality Improvement Third Edition, William E Lewis, Auerbach Publications, 2009

REFERENCES

1. Foundations of Software Testing **Second edition** by Aditya P. Mathur**, Pearson** 2014
2. Software Quality Assurance, Testing and Metrics by Anirban Basu, Prentice-Hall of   India Pvt.Ltd2015
3. Software Testing: A Craftsman's Approach, Fourth Edition by Paul C. Jorgensen Auerbach Publications, 2013
4. Advanced Software Testing Volume 1 by Rex Black Shroff, 2009
5. Advanced Software Testing Volume 2 ,by Rex Black Rocky Nook 2011

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CAS 2575 STEGANOGRAPHY AND DIGITAL WATER MARKING
(July 2016)

UNIT I   Watermarking and Steganography, basic classification of Steganography algorithms, Bitplane techniques, Transform techniques-spread spectrum, etc, Applications of Watermarking, Applications of Steganography

UNIT II   Covert channels Audio data Military E-commerce, Software for steganography, Steganalysis Scenarios- Extracting Hidden Information, Disabling Hidden Information, Software for Steganalysis

UNIT III   Applications and Properties of Digital Watermarking, Models of Watermarking - Communications Components of Communications Systems, Classes of Transmission Channels, Secure Transmission, Communication-Based Models of Watermarking, Basic Model, Watermarking as Communications with Side Information at the Transmitter, Watermarking as Multiplexed Communications, Geometric Models of Watermarking Using Perceptual Models

UNIT IV   Robust Watermarking, Watermarking Applications, Watermarking for Copyright Protection, Fingerprinting for Traitor Tracking, Watermarking for Copy Protection, Watermarking for Image Authentication, Watermark Security,

UNIT V   Content Authentication - Exact Authentication, Selective Authentication, Localization, Restoration. Definition of DRM, Requirements for DRM, Components of DRM, DRM and Privacy

TEXT BOOKS

1. **Cox, M. Miller, J. Bloom, J. Fridrich, T Kalker**, Digital Watermarking and Steganography, 2nd Ed. (The Morgan Kaufmann Series in Multimedia Information and Systems), 2007
2. **Katzenbeisser and Pertitcolas**,Information Hiding: Techniques for steganography and digital watermarking, Artech House, 2000.

REFERENCES

1. **Johnson, Duric, and Jajodia**, Information Hiding-Steganography and Watermarking – Attacks and Countermeasures, Kluwer, 2001.
2. **E. Becher, W. Buhse, D. Gunnewig**, N. Rump, Digital Rights Management: Technological, Economic, Legal and Political Aspects, Springer 1 edition (January 12, 2004)

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CAS 2576 SECURITY MEASURES IN COMPUTING SYSTEMS
(Revised July 2016)

UNIT I   Computer Security, Vulnerability Threat Control paradigm, Threats, Confidentiality, Integrity, Availability, Types of Threat, Types of Attack, Harm, Vulnerability, Controls, Analyzing Security with example. Attack – Impersonation, Countermeasure – Strong Authentication, Multi factor authentication, Secure Authentication, Password Guidelines

UNIT II   Programs – Attacks, Threat, Vulnerability and Counter measures, Types of Flaws, Secure Software Design elements, Counter Measures – Secure Software Development Process.

UNIT III   Malicious Code Attack , Threat – Malware, Virus, Trojan Horse and Worms, Counter Measures – Error correcting and Error detecting codes, Hash codes , Cryptographic checksum, Memory separation and Basic security principles.

UNIT IV   Computer Crime, Key logging, illicit data access, Physical access, method opportunity motive, Social Engineering, Insiders, Tracing Data flow, weak authentication, physical access control, Strong Authentication, Continuous Authentication

UNIT V   Security Characteristics in Cloud, Destruction of Code and Data, Hardware protection of executable space, Physical access, Physical security, Counter measures – Encryption, Investigation, Intrusion and Compromise, Counter measures.

TEXT BOOK

Charles P PFleeger, Shari Lawrence PFleeger, "Analyzing Computer Security A threat vulnerability Countermeasure Approach", Prentice Hall, 2012

REFERENCES

Ini Augustine, "Security in the Social Age- Scams , Threats and Crimes", Social wise media group Inc, 2015.

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CAS 2577 COMPILER DESIGN
(Revised July 2016)

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

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

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

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

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

TEXT BOOK

Keith D. Cooper & Linda Torczon, '**Engineering a Compiler',** 2nd Ed.,Elsevier, 2012

REFERENCES

1. Alfred V. Aho, Ravi Sethi, Jeffrey D Ullman, '**Compiler: principles ,Techniques and Tools'**, 2nd Ed., Pearson Education, 2014
2. Allen I Holub, '**Compiler Design in C',** Prentice Hall, 1994
3. Andrew W. Appel, '**Modern Compiler Implementation in C**', Revised Ed., Cambridge University Press 2004
4. Y N Srikanth, PritiShanker, '**Compiler Design Handbook: Optimization and Code Generation**' , 2nd Ed., CRC Press, 2008

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CAS 2578 BUSINESS ANALYTICS
(Revised July 2016)

UNIT I   Introduction – Ubiquity of Data Opportunities, Data Science and Data Driven decision Making, Data Processing and Big Data, Data Analytic Thinking, Data Science and Data Mining. Business Problems and Data Science Solutions -Fundamental concepts, From Business Problems to Data Mining Tasks, Supervised Versus Unsupervised Methods, The Data Mining Process, Other Analytics Techniques and Technologies. Introduction to Predictive Modeling: Fundamental concepts, Models, Induction, and Prediction, Supervised Segmentation, Visualizing Segmentations, Trees as Sets of Rules, Probability Estimation. Fitting a Model to Data - Fundamental concepts, Classification via Mathematical Functions, Regression via Mathematical Functions, Class Probability Estimation and Logistic "Regression", Nonlinear Functions, Support Vector Machines, and Neural Networks..

UNIT II   Overfitting - Fundamental concepts: Generalization, Overfitting, Overfitting Examined, From Holdout Evaluation to Cross-Validation, Learning Curves, Overfitting Avoidance and Complexity Control. Similarity, Neighbors, and Clusters - Fundamental concepts, Similarity and Distance, Nearest-Neighbor Reasoning, Important Technical Details Relating to Similarities and Neighbors, Clustering - Hierarchical Clustering, Clustering Around Centroids, Understanding the Results of Clustering. Solving a Business Problem versus Data Exploration

UNIT III   Decision Analytic Thinking I: Fundamental concepts, Evaluating Classifiers, Generalizing Beyond Classification, A Key Analytical Framework: Expected Value, Evaluation, Baseline Performance, and Implications for Investments in Data, Visualizing Model Performance - Fundamental concepts, Ranking Instead of Classifying, Profit Curves, ROC Graphs and Curves, The Area Under the ROC Curve (AUC), Cumulative Response and Lift Curves. Evidence and Probabilities - Fundamental concepts, Combining Evidence, Applying Bayes' Rule to Data Science, A Model of Evidence ``Lift''.

UNIT IV   Representing and Mining Text - Fundamental concepts, Representation – Bag of Words, Term Frequency, Measuring Sparseness: Inverse Document Frequency, Combining Them: TFIDF, The Relationship of IDF to Entropy; Beyond Bag of Words – N-gram Sequences, Named Entity Extraction, Topic Models. Decision Analytic Thinking II: Fundamental concept, Targeting the Best Prospects for a Charity Mailing – The Expected Value Framework: Decomposing the Business Problem and Recomposing the Solution Pieces, A Brief Digression on Selection Bias.

UNIT V   Other Data Science Tasks and Techniques - Fundamental concepts, Co-occurrences and Associations, Profiling, Link Prediction and Social Recommendation, Data Reduction, Latent Information, and Movie Recommendation, Bias, Variance, and Ensemble Methods, Data-Driven Causal Explanation.

TEXT BOOK

Foster Provost & Tom Fawcett, "Data Science for Business", SPD, 2013

REFERENCE

Jared P Lander, "R for Everyone: Advanced Analytics and Graphics", Addison-Wesley Data & Analytics Series, 2013.

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