Course Structure and Syllabi

Master of Computer applications (MCA)

Academic Programmes

July, 2013

Semester – I

Course Code	Course Name	L (Hr.)	T (Hr.)	P (Hr.)	C
CA-11001	Programming in C	3	0	0	3
CA-11002	Micro-processors and Assembly Language Programming	2	1	0	3
CA-11003	Discrete Mathematics	2	1	0	3
CA-11004	Engineering Economics and Costing	3	0	0	3
CA-11005	Lab – I (C Programming Lab)	0	0	4	2
CA-11006	Lab – II (Assembly Language Programming Lab)	0	0	4	2
G1002	Computer Applications	2	0	2	3
G11007	Research Methodology	3	0	0	3
G1001	Current Affairs	2	1	0	3
	Total				**25**

Semester – II

Course Code	Course Name	L (Hr.)	T (Hr.)	P (Hr.)	C
CA-12001	Data Structures Using C	3	0	0	3
CA-12002	Computer Organization and System architecture	2	1	0	3
CA-12003	Object orientated Programming using C++	3	0	0	3
CA-12004	Theory of Computation	2	0	0	2
CA-12005	Lab – III (Data Structure in C Lab)	0	0	4	2
CA-12006	Lab – IV (C++ Programming Lab.)	0	0	4	2
G2002	Computer Applications	2	0	2	3
G12007	Research Methodology	3	0	0	3
G2001	Current Affairs	2	1	0	3
CA-12007	Seminar	0	0	2	1
	Total				**25**

Semester – III

Course Code	Course Name	L (Hr.)	T (Hr.)	P (Hr.)	C
CA-13001	Analysis and Design of Algorithms	3	0	0	3
CA-13002	Operating Systems	2	1	0	3
CA-13003	Computer Networks	3	0	0	3
CA-13004	Data Base Systems	2	0	0	2
CA-13005	Lab – V (Operating System & Network Lab.)	0	0	4	2
CA-13006	Lab – VI (Data base Lab)	0	0	4	2
G3002	Computer Applications	2	0	2	3
G13007	Research Methodology	2	1	0	3
G3001	Current Affairs	3	0	0	3
CA-13007	Seminar	0	0	2	1
	Total				**25**

Semester – IV

Course Code	Course Name	L (Hr.)	T (Hr.)	P (Hr.)	C
CA-14001	Programming with Java	3	0	0	3
CA-14002	Computer Graphics & Multimedia	2	1	0	3
CA-14003	Software Engineering	3	0	0	3
CA-14004	Compiler Design	2	0	0	2
CA-14005	Lab – VII (Programming with Java Lab.)	0	0	4	2
CA-14006	Lab – VIII (Comp. Graphics & Multimedia Lab.)	0	0	4	2
G4002	Computer Applications	2	0	2	3
G14007	Research Methodology	2	1	0	3
G4001	Current Affairs	3	0	0	3
CA-14007	Seminar	0	0	2	1
	Total				**25**

Semester – Vth

Course Code	Course Name	L (Hr.)	T (Hr.)	P (Hr.)	C
CA-15001	Artificial Intelligence and Expert system	3	0	0	3
CA-15002	Object Oriented Analysis and Design with UML	2	1	0	3
CA-15003	Internet Technology and enterprise Java	3	0	0	3
CA-15004	Quantitative Techniques-II (Modeling & Simulation)	2	0	0	2
	ELECTIVE –I	3	0	0	3
	ELECTIVE –II	3	0	0	3
ELECTIVE – I					
CA-15005	Distributed Systems				
CA-15006	Parallel Computing				
CA-15007	Image Processing				
CA-15008	Web Engineering				
ELECTIVE – II					
CA-15009	Computer Security				
CA-15010	Software Design				
CA-15011	Bioinformatics				
CA-15012	Soft Computing				
CA-15013	Assignment *	0	0	4	2
CA-15014	Lab – X (Enterprise Web Computing Java Lab.)	0	0	4	2
CA-15015	Comprehensive Viva-voce				4
	Total				**25**

Semester – VIth

Course Code	Course Name	L (Hr.)	T (Hr.)	P (Hr.)	C
CA-16001	Project work for 16 weeks**				15
	Total				**15**

*   There will be atleast 10 weekly assignments to be submitted by students on the subject "object oriented Analysis and design with UML". Weekly evaluation will be done by a group of teachers of the department of 10 marks each taking personal viva of the students for a total of 100 marks.

**   There will be a 16 weeks project work to be undertaken by the students in any Industry / Institution. At the end of the project there will an evaluation of the project for 20 credits by a group of experts including one external expert and teachers of the department.

Course Code: CA-11001
Course Name:Programming in C

L T P C
3 0 0 3

Module-I (12 hours)
Introduction to computer: Evolution of computer, Computer system, Compiling environment, Time sharing, Client-Server environment, Distributed computing, Programming languages, Writing and editing programs, Compiling, linking and executing programs, System development, Life cycle, Program development.
Number representation in computer: Number systems, Storing of integers and real numbers, Overflow and underflow, exceptions, Flow chart
C language fundamentals: Character set, Key words, Identifiers, data types, Constants and variables, Statements, Expressions, Operators, Precedence and associativity of operators, Side effects, Type conversion, Managing input and output
Control structures: Decision making, branching and looping.

Module-II (15 hours)
Arrays: one dimensional, multidimensional array and their applications, Declaration and manipulation of arrays
Strings: String variable, String handling functions, Array of strings
Functions: Designing structured programs, Functions in C, User defined and standard functions, Formal vs. actual arguments, Function category, Function prototype, Parameter passing, Recursive functions.
Storage classes: Auto, Extern, register and static variables

Module-III (13 hours)
Pointers: Pointer variable and its importance, pointer arithmetic and scale factor, Compatibility, Dereferencing, L-value and R-value, Pointers and arrays, Pointer and character strings, Pointers and functions, Array of pointers, pointers to pointers
Dynamic memory allocation
Structure and union: declaration and initialization of structures, Structure as function parameters, Structure pointers, Unions.
File Management: Defining and opening a file, Closing a file, Input/output Operations in files, Random Access to files, Error handling
The Pre-processor directives, command line arguments, Macros.

Text books:
1. Behrouz A. **Forouzan**and Richard F. Gilberg.*Computer Science: A Structured Approach Using C*, Third Edition, 2007, CENGAGE Learning India Pvt. Ltd., New Delhi.
2. E. **Balguruswamy**, "*Programming in ANSI C_*", 4th edition, 2007, McGraw-Hill Publication, New Delhi.

Reference books;

1. K.R. Venugopal, S.R. Prasad, " Mastering C, McGraw-Hill Education India
2. P. Dey, M. Ghosh, "Programming in C", Oxford University Press
3. K.N. King,"C Programming-A modern approach'', W.W. Norton
4. S. Prata," C Primer plus", 5th Edition, Pearson Education India

Course Code: CA-11002
Course Name:Micro-processors and Assembly Language Programming

L	T	P	C
2	1	0	3

Module I: (15 Hours)
Digital Logic Fundamentals: Introduction, Number System, Binary Arithmetics, Logic Gates, Introduction to Multiplexer, Demultiplexer, Encoder, Decoder & Flip-Flops.

Microprocessor History, 8085 Architecture and Register organization, Functional Block Diagram, Bus Organization, 8085 Instruction Set, Instruction classifications, Instruction word size, Instruction format, Addressing modes, Assembly Language programming,

Memory, I/O devices, Addressing memory and I/O devices, Memory mapping, Memory Interfacing, Tri-State Devices, Buffers.

Module II: (13 Hours)
Programming techniques with additional instructions: Looping, Counting, Indexing, Introduction to Advanced Instructions, Instruction cycle, Machine cycle, Timing Diagram, Stack and subroutine, Counter and Time delay, Debugging.

Module III: (12 Hours) Interfacing Chips: 8255A (PPI), 8155 (Multipurpose Programmable Device), Interrupts, 8259A (PIC), Serial I/O and Data communication, Serial Data communication standard (RS 232C) 8257 or 8237A (DMA Controller), 8251A (USART). . 16 bit processor 8086: Introduction, Architecture, Pin Diagram, Min & Max Mode, Addressing Modes.

Text Books:
1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Application with 8085", 5th edition, Penram International Publishing (India) Pvt. Ltd.
2. D V Hall, "Microprocessor & Interfacing" McGraw Hill Education India

Reference Books:
1. A. P. Mathur , "Introduction to Microprocessor" McGraw Hill Education India.
2. B.Ram, "Fundamentals of Microprocessor and Microcomputer" DhanpatRai& Co Publication.
3. P K Ghosh, P R Sridhar, "0000 to 8085 Introduction to microprocessor to Engineers &Scientists"Prentice-Hall of India.

Course Code: CA-11003
Course Name:Discrete Mathematics

	L	T	P	C
	2	1	0	3

Module-I (15 hours)
Logic, Relation & Functions:
Logic: Propositions and logical Operations, Conditional statements; Predicate Calculus-First order logic, universal and existential quantifiers; Proof Techniques- methods of proof, Mathematical induction, recurrence relations.
Relation and Diagraphs- Properties of relations, composition of relations, closure operation on relations, equivalence relations and partitions, paths in relation and diagraphs, Operations on relations, Transitive closure and Warshall's Algorithm.
Partial ordered sets (poset), Hasse diagram, External elements of partially ordered sets
Functions, Functions for computer science, Growth of functions, Permutation functions

Module -II (13 hours)
Topics in Graph Theory: Directed and undirected graphs, basic terminology, paths and circuits, Eulerian paths and circuits, Hamiltonian paths and circuits, Transport Network, Graph coloring.
Trees: definition and properties, rooted trees, tree traversals— preorder, inorder, postorder, binary trees, labeled trees, spanning trees, cut sets, Graph traversals — BFS and DFS, Minimum cost spanning trees-Prim's and Kruskal's algorithm, Shortest paths in weighted graphs-Dijkstra's algorithm,.

Module-III (12 hours)
Algebraic Structures and Applications: Binary operations, semi-groups and groups, subgroups, cosets, Lagrange's theorem, Product and quotient semi-groups and groups, Normal subgroup, Homomorphism; coding of binary information and error detection, group codes, decoding and error correction.
Lattices, finite Boolean algebra, functions of Boolean algebra.

Recommended Text Books:
1. Bernard **Kolman,** Robert Busby, Sharon C. Ross, "*Discrete Mathematical Structures*", Sixth Edition, 2008, Pearson Education Inc., New Delhi. / Prentice Hall of India (PHI) Pvt. Ltd., New Delhi.

Reference Books:
1. Kenneth H. **Rosen, "***Discrete Mathematics and Its Applications*", Sixth Edition, 2008, Tata McGraw-Hill (TMH) Publications Pvt. Ltd., New Delhi.
2. D. S. **Malik** & M. K. Sen, "*Discrete Mathematical Structures*", First Edition, 2005, CENGAGE Learning India Pvt. Ltd., New Delhi.
3. Judith L. **Gersting**, "*Mathematical Structures for Computer Science: A Modern treatment to Discrete Mathematics*", Fifth / Sixth Edition (Asian Student Editions), 2008, W. H. Freeman & Company, New Delhi.
4. Richard **Johnsonbaugh**, "*Discrete Mathematics*", Seventh Edition, 2008, Pearson Education Inc., New Delhi.

Course Code: CA-11004
Course Name:Engineering Economics and Costing

L T P C
3 0 0 3

Module-I (12 hours)
Engineering economics- Nature and scope, The theory of demand, demand function, law of demand and its exceptions, Elasticity of demand, Law of supply and elasticity of supply. Determination of equilibrium price under perfect competition (Simple Numericalproblems to be solved).
Theory of production and cost, Law of variable proportion, Law of returns to scale,

Module-II (12 hours)
Time value of money-Simple and Compound Interest, Cash Flow Diagram, Principle ofEconomic Equivalence Evaluation of Engineering projects- Present worth method, Futureworth method, Annual worth method, Internal rate of return method, Cost-benefit analysisin public projects. Depreciation Policy,
Depreciation of capital assets, Causes of depreciation, Straight line method and declining balance method.

Module- III (12 hours)
Cost Concepts, Elements of costs, Preparation of cost sheet, Segregation of costs into Fixedand variable costs. Break-even Analysis-Linear Approach. (Simple Numericalproblems tobe solved).Banking: Meaning and functions of commercial banks, function of Reserve Bank of India.Overview Indian Financial System.

Text Books:
1. Riggs, Bedworth and Randhwa , "Engineering Economics", McGraw Hill Education India
2. C. T. Horngreen, " Cost Accounting ", Pearson Education India
3. R. R. Paul , "Money banking and International Trade", kalyanipubluisher, New-Delhi
4. H.L. Ahuja , "Principle of Economics", S. Chand & Co

Course Code: CA-11005
Course Name:Lab – I (C Programming Lab)

	L	T	P	C
	0	0	4	2

Topics:
1. Introduction to OS: Linux/Unix, DOS, and Windows.
2. vi editor basics, common commands on UNIX.
3. File handling, directory structures, file permissions, Creating and editing simple C programme, Compilation and execution.
4. C programming on variables and expressions.
5. Precedence of operators, Type casting.
6. Decision control structures— if and nested if-else.
7. Loop controls— do, while, for and case control structure.
8. Unconditional jumps— break, continue, goto.
9. Modular program development using functions.
10. Arrays and matrix operations—add, subtract, multiply.
11. Recursion
12. Pointers, address operators and pointer arithmetic.
13. Structures and Unions, Accessing their members.
14. Self-Referential Structures and Linked lists.
15. Files and file operations, standard streams.
16. Dynamic memory allocation and deallocations.
17. Different mathematical operations using <math.h>.
18. Pointers to pointers, arrays, functions, structures and unions.
19. Command line arguments, enums and prepocessors.
20. International features and Code optimization.

Course Code: CA-11006
Course Name:Lab – II (Assembly Language Programming Lab)

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L   T   P   C
0   0   4   2
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Topics:
1. Verification of 8085 Instruction Set.
2. Addition, Subtraction, Multiplication & Division of two 8-bit numbers.
3. Development of code conversion programs:
      a) Binary to Gray
      d) Gray to Binary
      c) ASCII to Binary
      d) Binary to ASCII
4. Identification of the ports and pins of I/O ports of Intel 8255.
5. Generation of Square, Triangular and Sinusoidal waveforms using DAC.
6. Study of Interrupt RST 7.5.
7. Stepper Motor control using 8085 Microprocessor.

Course Code: CA-12001
Course Name:Data Structures Using C

L T P C
3 0 0 3

Module-I (15 Hours)
Algorithms, Asymptotic notations and analysis, Measuring time and space complexities, Data structure and C: Functions, storage structures for arrays, sparse matrices, strings, pattern matching, structures and arrays of structures, Abstractio Mechanisms, Abstract data type, Stacks and Queues: representation and Applications.
Linked Lists: Singly linked lists, Linked stacks and queues, Operation on polynomial, Lnked dictionary, Doubly linked list, Circular linked list, Doubly circular linked lists,

Module-II (12 hours)
Dynamic storage Management, Garbage collection and compaction, Hashing functions. Hash tables and collision resolution techniques.
Trees: Binary trees, Terminologies and memory representation, Binary search trees, General trees, Tree traversing, Operations on binary trees, - Expression manipulations, Threaded binary trees, Height balancing trees, Heaps, forest, File structures, Introduction to multi-way search trees, B-tree and B^+-trees.

Module-III (10 hours)
Graphs: Terminologies and representation, Path matrix, graph traversal,- DFS and BFS, shortest path problems, Bi-connected graphs, Topological sort.
Sorting techniques: Bubble sort, selection sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, Shell sort and address calculation sort, Linear search and binary search.

Text books:
　1. Richard **Gilberg**, Behrouz A. **Forouzan**, "*Data Structures: A pseudo code approach with C*", Second Edition, 2007, CENGAGE India Pvt. Ltd., New Delhi.
　2. G.A. V. Pai, " Data Structure and Algorithms", McGraw Hills Education India

Reference Books:
　1. Alfred V. **Aho**, John E. **Hopcropt**& Jeffrey D. **Ullman**,"*Data Structures and Algorithm*", First Edition, 1983, Pearson Education Inc., New Delhi.
　2. Ian Chai & J. White, "Structuring data and building Algorithms", McGraw Hill Education India
　3. Aaron M. **Tenenbaum**, YedidyahLangsam& Moshe J. Augenstein**, "*Data Structure Using C*",** 1st Edition, 1990, Prentice-Hall of India (PHI) Pvt. Ltd., / Pearson Education Inc., New Delhi.
　4. Ellis **Horowitz**, SartajSahni, Susan Anderson-Freed, "*Fundamentals of Data Structures in C*", Second Edition, 2008, Universities Press Pvt. Ltd. Hyderabad.

Course Code: CA-12002
Course Name:Computer Organization and System architecture

L T P C
2 1 0 3

Module I: (15 Hours)
Introduction: Basic architecture of computer, Functional units, Operational concepts, Bus structures, Von Neumann Concept.
Basic Processing: Instruction code, Instruction set, Instruction sequencing, Instruction cycle, Instruction format, Addressing modes, Micro instruction, Data path, Hardwired controlled unit, Micro programmed controlled unit.
Arithmetic: Design of ALU, Binary arithmetic, Addition and Subtraction of signed number, Multiplication of Positive number, Signed operand multiplication, Division, Floating point number representation and arithmetic.

Module II: (12 Hours) Memory: Memory Hierarchy, RAM, ROM, Cache memory organization, Mapping techniques, Virtual memory, Mapping technique, Associative memory, Memory Interleaving, Secondary Storage, Flash drives.

Module III (13 Hours)
Input/Output: Accessing I/O devices, I/O mapped I/O, Programmed I/O, Memory Mapped I/O, Interrupt Driven I/O, Standard I/O interfaces, Synchronous and Asynchronous Data transfer, DMA data transfer.
Introduction to Parallel processing: Flynn's Classification, Pipelining, Array processing, vector processing

Text Books:
1. V. Rajaraman, and T. Radhakrishnan, " Computer Organization and Architecture", Prentice-hall of India
2. M. Murdocca," Computer Architecture and Organization- An Integrated Approach", Willey India Pvt Ltd

Reference Books:
1. William Stalling , " Computer Organization and Architecture "Pearson Education
2. J. P. Hayes "Computer Architecture and Organization" McGraw Hill Education India.
3. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "ComputerOrganization", 5th Edition, McGraw-Hill Education India 4. A.S. Tananbaum "Structured Computer Organization" Pearson Education.

Course Code: CA-12003
Course Name:Object orientated Programming using C++

L T P C
3 0 0 3

Module-I (12 hrs)
Introduction to C++ **:**C++ as multi-paradigm language, features supported by C++, syntax, data-type, const and bool qualifiers, variables, strings, operators
Control Structures, Decision and Loop Control Statements, Modular program design using functions, Top down program design with examples, parameter passing mechanisms, inline functions, recursion, Arrays and pointers, dynamic arrays, structures and unions in C++, Coding Style in C++
Object Oriented Programming in C++: Abstraction, OOP concepts, software life cycle, Abstraction Mechanisms: Procedural Abstraction and data abstraction; Classes and objects, object creation, access specifier-private, public and protected, constructors, default constructors, copy constructors, destructors, member functions, static members, references; Message communication using objects.

Module-II (12 hrs)
Inheritance: Is-a Vs. Has-a relationships, simple inheritance—Class hierarchy, derived classes, Multiple inheritance, multileveled and hybrid inheritance, Abstract Base Classes, Composition and aggregation with example, polymorphism—compile time & run time polymorphisms, object slicing, base class initialization, virtual functions and Dynamic Binding.
Overloading: Function overloading and Operator overloading, ambiguity, Overloading Restriction, friends function, member operators, operator function, I/O operators, Automatic Conversions and Type Casts for Classes, Memory management in C++: new, delete, object copying— deep & shallow copy, this pointer.

Module-III (12 hrs)
Exception Handling Mechanisms: Exceptions and exception class, exception declarations, unexpected exceptions, RTTI, Calling abort(), Returning an Error Code, Exception Mechanism, Using Objects as Exceptions
Templates and Standard Template Library (STL)**:** Generic Programming in C++, Template classes, declaration, Template functions, Template Classes and Friends, Namespaces and separate compilation; String class, Containers, Iterators, Vectors
Files in C++: Buffers, and the iostream File, redirection, streams and I/O streams classes, File Input and Output, Stream Checking and is_open(), Opening Multiple Files, Command-Line Processing, File Modes.

Recommended Texts:
1. B.A. Forouzan& R. F. Gilberg, " Astructured approach using C++", CENGAGE learning India
2. E. Balguruswamy. Object-Oriented Programming with C++, 3rd Edition, 2007, Tata McGraw-Hill (TMH) Publication Pvt. Ltd., New Delhi.

Reference Books:

1. David Parsons, "Object-Oriented Programming with C++", , Pearson Education .
2. H. Schild, "A complete reference to C++", TMH
3. Walter Savitch, "*Absolute C++*", 2ndEdition, 2007, Pearson Education Inc., New Delhi.
4. Stephen Prata," C++ Primer plus", Pearson Education

Course Code: CA-12004
Course Name:Theory of Computation

	L	**T**	**P**	**C**
	2	**0**	**0**	**2**

Module- I (12 hours)
Introduction of Automata, Computability, and Complexity ; Mathematical notations and terminology; Finding proofs and types of proofs.
Finite Automata and regular languages: Formal definitions, Designing finite automata, Deterministic finite automata, Non-deterministic finite automata, Equivalence of NFAs and DFAs, finite automata with ε-transition; regular expressions and languages, Properties of Regular languages, conversion of RE to FA and vice versa.

Module –II (12 hours)
Push down Automata and Context free languages: Context free grammars, Designing context free grammar, Ambiguity in CFG and its removal, Chomsky normal form
Push down Automata: formal definition, graphical notations, Languages accepted by PDA, Equivalence of PDA and CFG, Non-context free languages.

Module-III (12 hours)
Turing Machines and Computability: Formal definition of Turing machines with examples, Graphical notations, Variants of Turing machines, Church-Turing thesis, Hilbert's problem
Decidability, undecidability and reducibility: Decidable languages; Decidable problems concerning regular languages and context free languages, The halting problem, Post correspondence problems, Undecidable problems, Mapping reducibility, Decidability of logical theories, Turing reducibility.

Recommended Texts:
1. Michael **Sipser**, "Introduction to the Theory of Computation", Second Edition, 2007, CENGAGE learning India Pvt. Ltd., New Delhi.
2. John E. **Hopcroft**, Rajeev **Motwani**& Jeffrey D. **Ullman**, "*Introduction to Automata Theory, Languages, and Computation*", Third Edition, 2007, Pearson Education Inc., New Delhi.

Reference Books:
1. Nasir S.F.B., P.K. Srimani" A text book on Automata Theory", Cambridge University press India Pvt. Ltd.
2. Peter **Linz**, "*An Introduction to Formal Languages and Automata",* Fourth Edition, 2007, Narosa Publishing House, New Delhi.
3. John C. **Martin**, "*Introduction to Languages and the Theory of Computation*"**,** Third Edition, 2003, Tata McGraw-Hill (TMH) Publication Pvt. Ltd., New Delhi
4. Thomas A. **Sudkamp**, "*Languages and Machines*: *An Introduction to the* Theory of Computer Science", Third Edition, 2006, Pearson Education Inc., New

Course Code: CA-12005
Course Name:Lab – III (Data Structure in C Lab)

L	T	P	C
0	0	4	2

Topics:
1. Matrix Operations-Add, Multiply, Rank, Det.etc.
2. Stack & Queue operations using Arrays.
3. Self-referential structures & single linked list operations.
4. Implementing Stack and queues using linked lists.
5. Implementing Polish Notations using Stacks.
6. Circular and double linked list operations.
7. Implementing priority queue &dequeue using lists.
8. Evaluating polynomial operations using Linked lists.
9. Implementing set related operations & Hashing.
10. Linear & binary search, bubble sort technique.
11. Insertion sort, selection sort & merge sort techniques.
12. Quick sort, counting sort and Shell sort techniques.
13. Radix (bucket) and address calculation sort methods.
14. Binary tree traversals (preorder, inorder, postorder).
15. Heap sort & AVL tree implementations.
16. Graph representation with matrix & adjacency lists.

Course Code: CA-12006
Course Name:Lab – IV (C++ Programming Lab.)

L	T	P	C
0	0	4	2

Topics:
1. Implementing classes and creation of objects.
2. Checking Precedence of operators & side effects.
3. Implementing various control structures & loops.
4. Making structured programming & stepwise refinement.
5. Implementing Procedural abstraction with functions.
6. Implementing Constructors and destructors.
7. Implementing Data abstraction & inheritance.
8. Implementing Multiple & hybrid inheritance.
9. Implementing Polymorphism concepts.
10. Implementing Operator overloading & friend's functions.
11. Working with new & delete, object copying.
12. Implementing Object slicing, this operator.
13. Exception handling mechanisms.
14. Implementing class templates & function templates.
15. Working with STL.
16. Creating files in C++ and file related operations.

Course Code: CA-12007
Course Name:Seminar

L	T	P	C
0	0	2	1

Course Code: CA-13001
Course Name:Analysis and Design of Algorithms

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                                                            L   T   P   C
                                                            3   0   0   3
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Module-I (13 hours)
Introduction to analysis and design of algorithm, Growth of functions, Asymptotic notations, Recurrences, Solution of recurrences by substitution, Recurrence tree and the master method.
Divide and conquer algorithms (Worst case analysis of merge sort, quick sort and heap sort algorithms), Priority queue, Data structure for disjoint sets (Disjoint set operations, linked list representation, disjoint set forests)

Module-II (13 hours)
Dynamic programming approach: Matrix chain multiplication, longest common subsequence.
Greedy method: Activity solution problem, Greedy verses dynamic programming, Huffman codes. Concept of backtracking, branch & bound design techniques.
Graph algorithms: Minimal spanning tree (Kruskal and Prim's algorithms), Single source shortest paths (Bellman-Ford and Dijkstra's algorithm), Floyd's algorithm.

Module –III (14 hours)
Flow Network, Ford-Fulkerson method, Fast Fourier Transform, Rabin-Karp string matching algorithm.
NP-Completeness, Polynomial time solvability, Verification and Reducibility, NP complete problems (without proof), Approximation algorithm for the traveling salesman problem.

Text book:
1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and L.Stein, "*Introduction to Algorithms*" , Second Edition, PHI Learning, 2002
   Chapters: 1, 2, 3, 4(excluding 4.4), 6, 7 (7.4.1), 15(15.2, 15.3. 15.4), 16(16.1, 16.2, 16.3), 21(21.1, 21.2, 21.3) 23, 24(24.1, 24.2, 24.3), 26(26.1, 26.2), 30(30.1, 30.2), 32(32.1, 32.2), 34, 35(35.2)

Reference books:
1. E. Horowitz, S. Sahani, S. Rajsekharan, "*Fundamentals of Computer Algorithms*", Second Edition, Universities Press, 2007
2. J. Kleinbers, E.Tardos, *Algorithm design*, Pearson Education Inc., New Delhi , 2006
3. R. Johnsonbaugh, M. Schaefer, "*Algorithms*", Pearson Education Inc., New Delhi , 2004
4. Kenneth A. **Berman** & Jerome L. **Paul**, "*Algorithms*", Revised Edition, 2005, CENGAGE Learning India Pvt. Ltd., New Delhi.
5. Anany V**. Levitin, "***Introduction to the Design and Analysis of Algorithms***",** Second Edition, 2007, Pearson Education Inc., New Delhi.
6. Michael T. **Goodrich** and Roberto **Tamassia**, "*Algorithm Design: Foundations, Analysis, and Internet Examples*", 2nd Edition, Wiley India Pvt. Ltd., New Delhi

Course Code: CA-13002
Course Name:Operating Systems

L T P C
2 1 0 3

Module-1 (16 hours)
Introduction — Evolution of Operating Systems, Types of operating systems, Operating System Structures, Hardware and software structures needed for an operating system.
Process Management: Processes—States & Life cycle of process, Schedulers, Context Switching, Process scheduling policies—Preemptive vs. Non-preemptive, CPU scheduling algorithms, Threads—States & Life cycle of thread, thread scheduling, Types of threads & Examples. Inter-process Communication (IPC) Mechanisms—Concurrent processes, Process synchronization, Critical Section, Peterson's Solution, Classic IPC Problems, Semaphores, Concurrent programming, Monitors.

Module-2 (14hours)
Deadlock—Basic cause of deadlock, Conditions for deadlock, resource allocation graph, Wait for graph, Strategies for handling deadlocks, Starvation, Havender's linear ordering principle, deadlock avoidance & detection, Safe state, Dijikstra's Banker's Algorithm.
Memory Management: Main Memory, Static & Dynamic Partition schemes, multiple partitions schemes, Fragmentation, Compaction, Buddy Systems, Partition selection algorithms, de-allocation strategy, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory: Demand Paging, Copy-on-Write, Page Replacement Policies, Belady's Anomaly, Thrashing, Working set model.

Module-3 (10hrs)
Storage (File and Device) Management: File-System Interface, File-System Implementation, Mass-Storage Structure, Disk Scheduling, RAID Structure, I/O Systems.
Outline of : Multiprocessor Management, Protection & Security, Real-Time Operating Systems, and Multimedia Operating Systems, Case Studies: Windows XP/ Vista, Linux.

Text books:
  1. Abraham **Silberschatz**, Peter Baer **Galvin**, Greg **Gagne**, "*Operating System Concepts*", Eighth Edition, 2009, Wiley India Pvt. Ltd., New Delhi.
     Reading Chapters: 1-15 & 19-22 (excluding chapters: 16, 17, 18, and 23).
  2. Harvey M. **Deitel**, Paul J. **Deitel**, David R. **Choffnes**, "*Operating Systems*", Third Edition, 2004, Pearson Education Inc., New Delhi.

Reference Books:
  1. Andrew S. **Tanenbaum**, "*Modern Operating Systems*", Third Edition, 2008, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.
  2. Ramez**Elmasri**, A. G. **Carrick**, David **Levine**, "*Operating Systems: A Spiral Approach*", First Edition, 2009, McGraw-Hill Education (India), New Delhi.
  3. Ann **McIver Hoes** and Ida M. **Flynn**, "*Understanding Operating Systems*", Fifth Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
  4. Gary **Nutt**, "*Operating Systems*", 3rd Edition, 2004, Pearson Education Inc., New Delhi.
  5. William **Stallings**, "*Operating Systems: Internals and Design Principles*", Sixth Edition, 2009, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.

Course Code: CA-13003
Course Name:Computer Networks

	L	T	P	C
	3	0	0	3

Module-I (12 hours)
Introduction to Data Communications and Networking, Evolution of Computer Networks, General Principles of Network Design: Topologies, Network Models (ISO-OSI, TCP/IP), Network Architecture & Standardization (IEEE 802.x), Example Networks, Access Networks.
Physical Layer: Theoretical Basis for Data Communication-Data, Signals, Transmission (Digital vs Analog), Throughput, Bandwidth, Bit rate, Baud Rate, Data rate measurement-Nyquist formula & Shannon capacity, Multiplexing, Transmission Media (Guided Media, Unguided media: Wireless), Switching (Circuit , Message, Packet).

Module-II (16 hours)
Data Link Layer: Data Link Layer Design Issues, Error detection and Correction, Data Link Control, Elementary Data Link Protocols, Sliding Window Protocols, Protocol Verification, MAC Sub layer: Channel Allocation Problems, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband Wireless, Bluetooth, Data Link Layer Switching, Network devices: Repeater, Hubs, Bridges, Switches, Routers, Gateways, Backbone networks and Virtual LANs, Wireless WANs, Virtual Circuit Networks: Frame Relay and ATM
Network Layer: Network Layer Design Issues, Logical Addressing, Internet Protocol, Address Mapping, Error Reporting and Multicasting, Delivery, Forwarding, Routing Algorithms.

Module-III (12 hours)
Transport Layer: Transport Service, Elements of Transport Protocols, Process to Process Delivery—UDP, TCP, Congestion Control, Congestion Control Algorithms, Quality of Service.
Application Layer: DNS, Remote Logging, File transfer, SNMP, Multimedia, Ziff's law.
Security: Cryptography, Network Security, Kerberos, Internet Security: IPSec, SSL/TLS, PGP, VPN, Firewalls.

Text Books:
1. Behrouz A. **Forouzan**, "*Introduction to Data Communications and Networking*", Fourth Edition, 2007, McGraw-Hill Education (India), New Delhi.
2. Natalia **Olifer**& Victor **Olifer, "***Computer Networks: Principles, Technologies and Protocols*", First Edition, 2006, Wiley India Pvt. Ltd., New Delhi.

Reference Books:
1. Andrew S. **Tanenbaum**, "*Computer Networks*", Fourth Edition, 2003, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.
2. James F. **Kurose,** Keith W. **Ross**, "*Computer Networking: A Top-Down Approach Featuring the Internet*", 4th Edition (2008), Pearson Education Inc., New Delhi.
3. Wayne Tomasi, "*Introduction to Data Communications and Networking*", First Edition, 2005, Pearson Education Inc., New Delhi.
4. Prakash**Gupta**, *"Data Communication and Computer Networks"*, 2008, PHI Learning Pvt. Ltd., New Delhi.

5. Curt **White**, "*Data Communications and Networking*", First Edition, 2008, CENGAGE Learning India Pvt. Ltd., New Delhi.

6. L. L. Peterson & B. S. Davie," *Computer Networks*", Fourth Edition, Elsevier Inc,

Course Code: CA-13004
Course Name:Data Base Systems

L T P C
2 0 0 2

Module 1 (10 hours)
Introduction: Data & Information, Evolution of Database Systems, Overview of a DBMS, Database System Concepts & Architecture - Data models, schemas and instances, Data Abstraction, Data Independence, Database languages and interfaces.
Database Characteristics: Data modeling using Entity - Relationship (ER) Model: Entity sets, attributes and keys, Relationship types, sets, roles and structural constraints, Weak Entity types. Data Models: Relational, Network, Hierarchical and Object Oriented.
The Relational model: Relational data model concepts, Codd's 12 rules, Relational model constraints and schemas, Relational Algebra and Relational calculus, Constraints on Relations, Relational database design by ER & EER to Relational Mapping, Database Language SQL & QBE. SQL Programming Techniques: Constraints and Triggers, Views and Indexes, SQL in Server Environment.

Module 2 (16 hours)
Database Design: Data dependency, Armstrong's Axioms, Functional dependencies and Normalization of Relational Databases, First, Second and Third Normal forms, Boyce-Codd Normal form (BCNF), Relational Database design Algorithms and further dependencies, De-normalization
Storage Strategies and file organizations: Disc Storage, Basic File Structures and Hashing, Indexing structures for files, multi-level indexing using B-trees and B^+-trees.
Query Processing and Optimization: Evaluation of Relational Algebra Expressions, Query Equivalence, Join strategies, Query Execution, Query Compiler, and Query Optimization Algorithms.

Module 3 (14 hrs)
Transaction processing concepts: Introduction to Transaction Processing concepts and Theory, ACID Properties, concurrency control, Serializability and Recoverability, Database recovery techniques - Shadow paging, ARIES recovery algorithm, Database Security. Deadlock: Detection, Avoidance and Recovery.
Outline of: Information Integration, Data Mining, Data Warehousing and OLAP, Database Systems and the Internet, Search Engines, Semi-structured Data Model, XML and Web Databases, Object & Object Relational Databases, Distributed Databases, Deductive Databases, Mobile Databases, Multimedia Databases, GIS.

Text Books:
1. Ramez**Elmasri**and Shamkant B. **Navathe**, "*Fundamentals of Database Systems*", Fifth Edition (2007) , Pearson Education Inc., New Delhi.
2. Abraham **Silberschatz,** Henry F**. Korth**and S. **Sudarshan, "***Database Systems Concepts*", Fifth Edition (2006), McGraw-Hill Education , New Delhi

Reference Books:

1. Hector **Garcia-Molina**, Jeffret D. **Ullman**, Jenniffer**Widom**, "*Database Systems: A Complete Book"*, Second Edition, 2009, Pearson Education Inc., New Delhi.
2. Peter **Rob** & Carlos **Coronel**, "*Database Systems: Design, Implementation, and Management*", Eighth Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
3. Mark L. **Gillenson**, "*Fundamentals of Database Management Systems*", First Edition, 2005, Wiley India Pvt. Ltd., New delhi.
4. Nilesh**Shah**, "*Database Systems Using Oracle*", Second Edition, 2005, PHI Learning Pvt. Ltd., New Delhi.
5. *Raghu Ramakrishnan*, Johannes **Gehrke**, **"Database Management Systems", Third** Edition (2003), McGraw-Hill Education (India), New Delhi.

Course Code: CA-13005
Course Name:Lab – V (Operating System & Network Lab.)

L	T	P	C
0	0	4	2

Topics:
01. UNIX Structures, UNIX/LINUX Commands, Common Commands practice session.
02. vi/vim editor basics, creating & managing files with vi/vim.
03. Working with sed and awk, programming with awk.
04. Shell scripting, shell variables, data types.
05. Shell programming-control structures, loops etc.
06. Creating processes- fork and join, pid, child process.
07. Implementing Threads, Thread programming.
08. Inter process communication-Producer & consumer.
09. Implementing readers and writers problem using c/c++.
10. Implementing sleeping barber problem using c/c++.
11. Implementing semaphores using c/c++.
12. Implementing deadlock mechanism using c/c++.
13. Implementing bankers algorithm using c/c++.
14. Simulation program for memory allocation & de-allocation.
15. Implementing file allocation problem using c/c++.
16. Socket programming in C: Client and server Sockets.
17. Connection establishment through TCP/IP Sockets.
18. Communicating with server w. r. t. clients via sockets
19. Implementing a File copy program using Sockets.
20. Creating and Installing Server Software.

Course Code: CA-13006
Course Name:Lab – VI (Data base Lab)

L	T	P	C
0	0	4	2

Topics:
01. Installation of Oracle or MySQL.
02. Learning basic DDL and DML commands
03. Learning basic DCL and TCL commands.
04. Insertion, Deletion, Updating to a table using SQL commands
05. Working with dual table.
06. Data retrieval using Select & where clause.
07. Oracle inbuilt functions-Date, aggregate, group by etc.
08. Use of Joins and Sub queries.
09. Views, sequences and indexes.
10. Managing users, privileges and roles.
11. PL/SQL-Data types, control structures.
12. Creating procedures with PL/ SQL.
13. Error handling in PL/ SQL.
14. Cursor Management in PL/ SQL.
15. Sub program design in PL/ SQL.
16. Writing Program segments in embedded SQL using C/C++.
17. Writing Programs on Packages & triggers.
18. Implementing OO features in Oracle.
19. Report generation using SQL.
20. Database backup & Recovery Management.

Course Code: CA-13007
Course Name:Seminar

L	T	P	C
0	0	2	1

Course Code: CA-14001
Course Name:Programming with Java

L T P C
3 0 0 3

Module – 1 (16 hours)
Introduction to Java Programming Language, Data Types and Operations, Structured Programming, Selection Statements, Loops, Methods, Method Abstraction and Stepwise Refinement, Arrays, Object-Oriented Programming: Classes and Objects, Constructors, Implementing & Designing Classes, Use of Keywords: static, final, this, Class Abstraction and Encapsulation, Strings and Text I/O, Inheritance and Polymorphism, use of super keyword, Overriding vs. Overloading, Object: The Cosmic Superclass, Abstract Classes and Interfaces, Packages, Object-Oriented Design and Patterns.

Module – 2 (12 hours)
GUI Programming: GUI Basics, Graphics, Event-Driven Programming, Creating User Interfaces, Applets and Multimedia, Exception Handling, Binary I/O, Files & Streams, Recursion, Dynamic Binding, Generics & Generic Programming, Java Collections Framework, Algorithm Efficiency, Searching & Sorting.

Module – 3 (12 hours)
Multithreading, Networking, JDBC, Internationalization, Advanced GUI Programming: MVC, JavaBeans and Bean Events, Containers, Layout Managers, and Borders, Menus, Toolbars, Dialogs and Swing Models, JTable and JTree, New Features of Java.

Text Books:
1. Y. Daniel **Liang**, "*Introduction to Java Programming: Comprehensive Version*", 7th Edition, 2009, Pearson Education Inc., New Delhi.
   (Book Chapters: 1 to 24, 26, 29 to 37)
2. Cay S. **Horstmann, "***Big Java***",** 3rd Edition, Wiley India Pvt. Ltd., New Delhi.

Reference Books:
1. Richard A. **Johnson**, "*An Introduction to Java Programming and Object Oriented Application Development*", First Edition, 2007, CENGAGE Learning India Pvt. Ltd., New Delhi.
2. E. **Balagurusamy**, "*Programming with Java: A Primer*", 3rd Edition, 2008, McGraw-Hill Education (India), New Delhi.
3. Harvey M. **Deitel**& Paul J. **Deitel**, "*Java How to Program*", 8th Edition, 2009, PHI Learning Pvt. Ltd., New Delhi.
4. Mahesh P. **Bhave**& Sunil A. **Patekar**, "*Programming with Java*", First Edition, 2009, Pearson Education, Inc. New Delhi.
5. P. **Radha Krishna**, "*Object-Oriented Programming through Java*", First Edition, 2007, Universities Press (India) Pvt. Ltd., Hyderabad.

Course Code: CA-14002
Course Name:Computer Graphics & Multimedia

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                                                    L   T   P   C
                                                    2   1   0   3
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Module – 1 (14 hours)
Computer Graphics: A Survey of Computer graphics, Overview of Graphics System: Video Display Devices, Raster-Scan Systems, Input Devices, Hard-Copy Devices, Graphics Software, Introduction to OpenGL.
Graphics Output Primitives: Point and Lines, Algorithms for line, circle & ellipse generation, Filled-Area Primitives. Attributes of Graphics Primitives: Point, line, curve attributes, fill area attributes, fill methods for areas with irregular boundaries, Antialiasing.
Geometric Transformations (both 2-D & 3-D): Basic Geometric Transformations, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Inverse Transformations, Other Transformations (Reflection, shear), Transformation between coordinate systems, Affine Transformations.
Two Dimensional Viewing: Viewing pipeline, Clipping Window, Normalization & Viewport coordinate Transformations, Clipping Algorithms: Point clipping, Line clipping and Polygon clipping. Three Dimensional Viewing: 3-dimensional Viewing Concepts, Viewing pipeline, Projection Transformations (Orthogonal, Oblique parallel, Perspective), Clipping Algorithms.

Module – 2 (14 hours)
Three Dimensional Object Representations: Curved Surfaces, Quadratic Surfaces, Spline Representations, Bezier Spline Curves and Surfaces, B-Spline Curves and Surfaces, Octrees, BSP Trees, Fractal Geometry Methods, Shape Grammars.
Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer method, A-Buffer Method, Scan line and Depth Sorting, Area subdivision Method, Ray Casting Method.
Illumination Models: Basic Illumination Models, Displaying light Intensities, Halftone Patterns and Dithering techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading), Ray-Tracing Methods (Basic Ray-Tracing Algorithm, Ray-Surface Intersection Calculations).
Computer Animation, Hierarchical Modeling (introductory idea only).

Module – 3 (12 hours)
Multimedia Fundamentals: Introduction, Multimedia & Hypermedia, WWW, Multimedia software tools, Multimedia Authoring and Tools, Graphics and Image Data Representation, Color Models in images & video, Fundamental Concepts in Video, Basics of digital Audio.
Multimedia Data Compression: Lossless Compression Algorithms (Basics of Information Theory, Run length coding, variable length coding, lossless image compression), Lossy Compression Algorithms (distortion measure, quantization, Discrete Cosine transform), Basic Image Compression standard-JPEG, Basic Video Compression standard-MPEG (MPEG-1&2).

Text Books:
1. Donald **Hearn** & M. Pauline **Baker**, "*Computer Graphics with OpenGL*", Third Edition, 2004, Pearson Education, Inc. New Delhi.
2. Ze-Nian**Li** and Mark S. **Drew**, "*Fundamentals of Multimedia*", First Edition, 2004, PHI Learning Pvt. Ltd., New Delhi.

Reference Books:

1. Jennifer **Burg**, "*The Science of Digital Media*", First Edition, 2009, Pearson Education Inc., New Delhi.
2. Francis S. **Hill** & Stephen M. **Kelly**, "*Computer Graphics using OpenGL*", Third Edition, 2007, PHI Learning Pvt. Ltd., New Delhi.
3. Zhigang**Xiang**, Roy A. **Plastock**, "*Computer Graphics*", Second Edition, 2007, McGraw-Hill Education (India), New Delhi.
4. Leen**Ammeral**, Kang **Zhang**, "*Computer Graphics for Java Programmers*", Second Edition, 2007, Wiley India Pvt. Ltd., New Delhi.
5. Edward A. **Angel**, "*Interactive Computer Graphics: A Top-Down Approach Using OpenGL*", Fifth Edition, 2009, **Pearson** Education Inc., New Delhi.

Course Code: CA-14003
Course Name:Software Engineering

L T P C
3 0 0 3

Module-I (12 hours)
Introduction: Evolution and impact of Software Engineering, Socio-technical Systems, Critical Systems, Software Processes, and Software Life cycle Models, Software Project Management.
Requirements & Specification: Software Requirements, Requirements Engineering Processes, Feasibility study, Requirements analysis and specification, System Models, Critical System Specification, Formal Specification.

Module-II (14 hours)
Design and Analysis Aspects: Architectural Design – Cohesion and coupling, Abstraction, Data flow Oriented Design, Distributed Systems Architecture, Application Architectures, Object-Oriented Design, Real-time Software Design, User Interface Design and Usability Engineering.
Software Development: Rapid Software Development, Software Reuse: Design Patterns, Component Based Software Engineering (CBSE), Critical Systems Development, Software Evolution.
Implementation and Testing: Verification and Validation, Software Testing, Critical Systems validation.

Module-III (14 hours)
Software Reliability and Quality Management: Musa's Reliability Model, Managing People, Software Cost Estimation— COCOMO Model, Quality Management, Process Improvement, Configuration Management, Software Maintenance, CASE Tools.
Modern Trends and Emerging Technologies: Humphrey's Capability Maturity Model, CMMI (Capability Maturity Model Integration), Agile software development, Extreme Programming (XP), Security Engineering, Service-oriented Software Engineering, Aspect-oriented Software Development.

Text Books:
1. Rajib**Mall**, "*Fundamentals of Software Engineering*", 2nd Edition, 2007, PHI Learning Pvt. Ltd. New Delhi.
2. Ian **Sommerville**, "*Software Engineering***,** 8th Edition, 2007, Pearson Education Inc., New Delhi.

Reference Books:
1. Roger S. **Pressman**, "*Software Engineering: A Practitioner's Approach*", 7th International Edition, McGraw-Hill Education (Asia), Singapore.
2. Shari Lawrence **Pfleeger,** Joanne M. **Atlee**, "*Software Engineering*", 3rd Edition (2006) , Pearson Education, Inc. New Delhi.
3. Ben **Shneiderman**, Catherine **Plaisant**, "*Designing the User Interface: Strategies for Effective Human-Computer Interaction*", 4th Edition (2006), Pearson Education, Inc. New Delhi.

4. Pankaj**Jalote**, "*Software Engineering*", First Edition, 2009, Wiley India Pvt. Ltd., New Delhi.

5. Dines **Bjørner, "***Software Engineering: Volume-1, Volume-2 & Volume -3",* Springer India Pvt. Ltd., New Delhi.

Course Code: CA-14004
Course Name:Compiler Design

L T P C
2 0 0 2

Module 1 (12 hours)
Introduction, Lexical Analysis (Scanning), Lexical-Analyzer Generators: Lex& Flex, Syntax Analysis (Parsing): CFG, Top-Down Parsing, Bottom-Up Parsing, LR Parsing Methods: SLR, Canonical LR, LALR, Parser Generators-YACC & BISON.
Semantic Analysis: Attribute Grammars & Syntax-Directed Translation Schemes (SDTS).

Module 2 (12 hours)
Intermediate-Code Generation Techniques, Type Checking, Run-Time Environments: Storage Organization, Allocation & Management of Stack and Heap, Garbage Collections, Register allocation and Code Generation.

Module 3 (16 hours)
Machine-Independent Optimizations, Interprocedural Analysis: Basic Concepts, Requirement of Interprocedural Analysis, Logical Representation of Data Flow, Pointer-Analysis Algorithm, Context-Insensitive Interprocedural Analysis, Context-Sensitive Pointer Analysis, Datalog Implementation.

Text Books:
1. Alfred V. **Aho,** Monica S. **Lam,** Ravi **Sethi,** Jeffrey D. **Ullman, "***Compilers: Principles, Techniques, and Tools***",** 2nd Edition, 2007, Pearson Education Inc., New Delhi. [Chapters-1, 3 to 9 (excluding 7.8), 12]
2. Kenneth C. **Louden**, "*Compiler Construction: Principles and Practices*", First Edition, 1997, CENGAGE Learning India Pvt. Ltd., New Delhi.

References Books:
1. Pat D. **Terry, "***Compiling with C# and Java***",** 2006, Pearson Education Inc., New Delhi.
2. Dick **Grune**, Henri E. **Bal**, Ceriel J. H. **Jacobs**, Koen**Langendoen,** "*Modern Compiler Design*", First Edition (2000), Wiley India Pvt. Ltd., New Delhi.
3. Keith D. **Cooper**, Linda **Torczon**, "*Engineering a Compiler*", First Edition (2004), Elsevier India Pvt. Ltd., New Delhi.
4. G. **SudhaSadasivam**, "*Compiler Design*", 2008, SCITECH Publications (India) Pvt. Ltd, Chennai.
5. David **Galles**, "*Modern Compiler Design*", 2006, Dreamtech /Pearson Education Inc., New Delhi.

Course Code: CA-14005
Course Name:Lab – VII (Programming with Java Lab.)

L	T	P	C
0	0	4	2

Topics
01. Introduction, Compiling & executing a java program.
02. Program with data types & variables.
03. Program with decision control structures: if, nested if etc.
04. Program with loop control structures: do, while, for etc.
05. Program with classes and objects.
06. Implementing data abstraction & data hiding.
07. Implementing inheritance.
08. Implementing and polymorphism.
09. Implementing packages.
10. Implementing generics.
11. Program with modern features of java.
12. Implementing interfaces and inner classes
13. Implementing wrapper classes
14. Implementing generics.
15. Implementing cloning.
16. Implementing Reflections
17. Working with files.
18. Implementing a Lexical Analyzer
19. Implementing a parser
20. Implementing a code generator

Course Code: CA-14006
Course Name:Lab – VIII (Comp. Graphics & Multimedia Lab.)

L	T	P	C
0	0	4	2

Topics
01. Introduction to OpenGL Programming.
02. Implementing line drawing algorithms.
03. Implementing circle drawing algorithms.
04. Implementing ellipse drawing algorithms.
05. Implementing Line Clipping Algorithms.
06. Implementing Polygon Clipping Algorithms.
07. Implementing 2-d Transformations.
08. Implementing 3-d Transformations.
09. Implementing scan fill, boundary fill algorithms.
10. Implementing seed fill, flood fill algorithm.
11. Writing program on B-Splines, Bezier Curves
12. Writing program on Mandelbrot set & Julia set.
13. Writing program on Sierpinski gasket, Koch curve.
14. Writing program on Fractal trees & forest.
15. Writing program on wire frame model & terrain generation.
16. Implementing Ray tracing algorithm.
17. Writing program on Animation & Morphing techniques.

Course Code: CA-15001
Course Name:Artificial Intelligence and Expert system

L T P C
3 0 0 3

Module-1 (15 hours)
Artificial Intelligence: Introduction, Intelligent Agents: Agents & Environments, Concept of Rationality, Nature & Structure of Agents; Problem Solving: Solving Problems by Searching, Classical Search, Adversarial Search, Constraint Satisfaction Problems. Knowledge, Reasoning and Planning: Logical agents, First order logic, Inference in First order logic.

Module-2 (13 hours)
Classical planning, Knowledge Representation; Uncertain Knowledge and Reasoning: Probabilistic Reasoning, Learning from Examples, Knowledge in Learning; Natural Language Processing: Language models, Text Classification, information retrieval, information extraction

Module-3 (12 hrs)
Natural Language for Communication: Phrase structure Grammars, Syntactic Analysis, Augmented grammars and semantic interpretation, Machine translation, Speech recognition; Perception; Expert Systems: Introduction, Design of Expert systems.

Text Books:
1. Stuart **Russell** and Peter **Norvig**, "*Artificial Intelligence: A Modern Approach*", Third Edition, 2010, Pearson Education, New Delhi.
   Chapters: 1, 2, 3, 4 (4.1, 4.2), 5 (5.1, 5.2, 5.3), 6, 7, 8, 9, 10 (10.1, 10.2, 10.3, 10.5), 12, 14 (14.1-14.6), 18 (18.1- 18.7), 19 (19.1, 19.2, 19.3), 22, 23, 24 (24.1-24.3, 24.5).
2. Joseph **Giarratano**and Gary **Riley**, "*Expert Systems: Principles and Programming*", Fourth Edition, CENGAGE Learning India Pvt. Ltd., New Delhi.
   Chapters: 1 and 6.

Reference Books:
1. Elaine A. **Rich** and Kevin **Knight**, "*Artificial Intelligence*", 3rd Edition, 2009, McGraw-Hill Education (India), New Delhi.
2. Nills J. **Nilsson**, "*Artificial Intelligence: A New Synthesis*", 2nd Edition, 2000, Elsevier India Publications, New Delhi.
3. Michael **Negnevitsky**, "*Artificial Intelligence: A Guide to Intelligent Systems*", Second Edition, 2005, Pearson Education, Inc. New Delhi.
4. Dan W. **Patterson**, "*Introduction to Artificial Intelligence and Expert Systems*", 1st Edition, 1996, PHI Learning Pvt. Ltd., New Delhi.
5. Ben **Coppin**, "*Artificial Intelligence Illuminated*", 2005, Narosa Publication, New Delhi. ISBN: 978-81-7319-671-3

Course Code: CA-15002
Course Name:Object Oriented Analysis and Design with UML

	L	T	P	C
	2	1	0	3

Module-I (15 hours)
Introduction: Object orientation & Object oriented development, Modeling Concepts: Modeling as a design technique, Class Modeling, advanced class modeling, State Modeling, advanced State Modeling, Interaction Modeling, advanced Interaction Modeling.

Module-II (13 hours)
Analysis and Design: Process overview, system Conception, Domain Analysis, System Design, Class design.

Module-III (12 hours)
Implementation: Implementation Modeling, Object Oriented (OO) Languages, Databases, Programming Style.

Text Books:
   1. Michael R. **Blaha**and James R **Rambaugh**, "*Object-Oriented Modeling and Design with UML*", Second Edition, 2005, Pearson Education, Inc. New Delhi.
      Chapters: 1 to 8, 10, 11, 12, 14, 15, 17, 18, 19, 20.
   2. Mark **Priestley**, "*Practical Object-Oriented Design with UML*", Second Edition, 2006, McGraw-Hill Education, India. New Delhi.

Reference Books:
   1. Grady **Booch**, "*Object-Oriented Analysis and Design with Applications*", Third Edition, 2007, Pearson Education, Inc. New Delhi.
   2. Craig **Larman**, "*Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development*", Third Edition, 2005, Pearson Education, Inc. New Delhi.
   3. Mike **O'Docherty**, "*Object Oriented Analysis and Design: Understanding System Development with UML 2.0*", 2005, Wiley India Pvt. Ltd., New Delhi.
   4. John W. **Satzinger**, Robert B. **Jackson**, Stephen D. **Burd**, "*Object-Oriented Analysis and Design with the Unified Process*", 2006, CENGAGE Learning India Pvt. Ltd., New Delhi.
   5. James **Rumbaugh**, Grady Booch, Ivar Jacobson, "*The Unified Modeling Language*

Course Code: CA-15003
Course Name:Internet Technology and enterprise Java

L T P C
3 0 0 3

Module-I (15 hours)
Internet and Web Technology: ntroduction and overview, Internetworking concept and architectural model, classful internet addresses, classless and subnet address extensions (CIDR), Protocol Layering, , Mobile IP, Client Server model, World wide web, Voice and Video over IP.
Web Programming:- Web 2.0, Web Browsers, Web Servers, URLs, URN, URI, Basics of HTML & XHTML Programming: Syntax, Document structures, images, hyperlinks, List, Tables, Forms, Frames, CSS, Basic JavaScript Programming: DOM, Loops, function and arrays. XML: Document structure, DTD, Namespaces, XML Schema, and Parsing XML documents.

Module-II (15 hours)
Enterprise Java Programming: Overview, Java EE 6 API, Web Applications, Java Servlet Technology: - Lifecycle of a Servelet, Servelet API, Servlet Packages, Types of servlets, Database Access, Stateless and Stateful protocols, Session Tracking. JSP Technology: - Architecture & Anatomy of JSP Page, JSP life cycle, JSP with MVC Architecture, Dynamic webpage Creation, Scripting Elements, Session Tracking, Database access, JSTL, JavaServer Faces (JSF) Technology, Facelets, Ajax.

Module-III (10 hours)
Web Services: Building Web services with JAX-WS, Enterprise JavaBeans Technology: EJB Component Architecture, Role of EJB & its life cycle, Types of Beans, Stateless and stateful beans, Security features of EJB, Contexts and Dependency Injection for the Java EE Platform; Java Persistence API, Security in Java EE, Java EE Supporting Technologies: Introduction, Transactions and Resource Connections.

Recommended Books:
1. Douglas E. **Comer**, "*Internetworking with TCP/IP, Volume 1: Principles, Protocols and Architecture*", Fifth Edition, 2006, PHI Learning Pvt. Ltd., New Delhi.
   Chapters: 1, 3, 4, 9, 10, 18, 20, 27, 28.
2. Ralph **Moseley**, "*Developing Web Applications*", 2008, Wiley India, New Delhi.
3. Eric **Jendrock**, D. Carson, I. Evans, D. Gollapudi, K. Haase, C. Srivastha, "*The Java EE6 Tutorial*", Volume-1, Fourth Edition, 2010, Pearson India, New Delhi.
   Chapters: 1, 3, 4, 5, 7, 9 to 12, 14 to 16, 17, 19, 23, 26, 27, 28.

References:
1. Joe **Wigglesworth**, Paula **McMillan**, "*Java Programming: Advanced Topics*", 3rd Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
2. William **Stallings**, "*Computer Networking with Internet Protocols and Technology*", 2004, Pearson education, New Delhi.
3. **Kongent S.**, "*Java Server Programming (JEE 6) Black Book, Platinum Edition*", 2008, Dreamtech / Wiley India Pvt. Ltd.

4. David **Geary**, Cay S. **Horstmann**, "*Core JavaServer Faces*", Second Edition, 2007, Pearson Education, Inc. New Delhi.

5. Adrian **Farrel**, "*The Internet and its Protocols: A Comparative Approach*", 2005, Elsevier India Pvt. Ltd., New Delhi.

Course Code: CA-15004
Course Name:Quantitative Techniques-II (Modeling & Simulation)

L	T	P	C
2	0	0	2

Module-1 (12 hours)
Markov Chain: Stochastic Processes, Markov chains, Chapman-Kolmogorov equations, States of a Markov chain, Properties of Markov chains, Continuous time Markov chains. Markov Decision Process: Model for Markov decision Process, Linear programming and optimal policies, Policy improvement algorithm, Discounted cost criterion

Module-2 (12 hours)
Random numbers, Psedo random number generation, Using random numbers to evaluate integrals, Generation of discrete random variables: Inverse transform method, generating Poisson and Binomial random variables, the acceptance – rejection technique
Generating continuous random variable : The inverse transform algorithm, the rejection method, the polar method for generating normal random variables, generating Poisson process.
Discrete event simulation approach: Simulation via discrete event, the single server queuing system, Queuing system with two servers in series and with two parallel servers, Inventory model.

Module-3 (12 hrs)
Variance reduction technique: Use of antithetic variable, use of control variates, variance reduction by conditioning, stratifies sampling, Importance sampling.
Statistical validation techniques: Goodness of fit tests, Chi-square goodness of fit test for discrete data, Kolmogorov- Smirnov test for continuous data, Goodness of fit test when some parameters are unspecified, two sample problem.

Text Books
1. Frederick S. **Hiller**, Gerald J. **Lieberman**, "*Introduction to Operations Research*", McGraw Hill Education India Pvt. Ltd, Eighth edition, 2008, New Delhi.

2. Sheldon M. **Ross**, " *Simulation*", Academic Press(an imprint of Elsevier), Fourth edition

Reference Books:
1. Hamdy A.Taha,"*Operations research*", Pearson Education India, New Delhi
2. Jerry **Banks**, John S. **Carson II**, Barry L. **Nelson**, David M. **Nico**l, "*Discrete Event System Simulation*", 5th Edition, 2010, Pearson education Inc. New Delhi.
3. Andrew **Seila**, Vlatko**Ceric**, Pandu**Tadikamalla**, "*Applied Simulation Modeling*", 1st Edition, 2009, Cengage Learning pvt.Ltd. New Delhi.
4. Manuel D. **Rossetti**, "*Simulation, Modeling and Arena*", First Edition, 2009, Wiley India Pvt. Ltd. New Delhi.
5. Bernard P. **Zeigler**, Herbert **Praehofer**, Tag Gon**Kim**, "*Theory of Modeling and Sim*

Course Code: CA-15005
Course Name:Distributed Systems

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Module-I (12 hours)
Distributed systems: Definition, goals, types of Distributed Systems, Architectures, Key characteristics-resource sharing openness, concurrency, scalability, fault tolerance, transparency; Design issues, naming, communication, software structure, workload allocation, consistency maintenance; User requirement, functionality, Quality of service, reconfigurability; Interprocess communication, building blocks, client server communication; CORBA's Common Data Representation (CDR); Java object serialization; Extensible markup language (XML); Remote object references; Inter-process communication in UNIX; Remote procedure calling; Design issues, interface definition language exception handling; Implementation - interface processing, communication handling; Binding, Case study: sun RPC Vs. Java RMI.

Module-II (12 hours)
Distributed Operating systems: kernel, processes and threads, Naming and protection - Communication and Invocation, virtual memory, Distributed file services - design issues, interfaces, implementation techniques, Case study sun NFS, Name services: Name spaces; Name resolution, Domain Name System, SNS and DNS, Peer-to-Peer Systems. Coordination and Agreement: Time and Global States, Time and co-ordination, Synchronizing physical clocks- logical time and logical clocks, Distributed co-ordination, distributed mutual exclusion, elections, Replication, basic architectural model, consistency and request ordering.

Module-III (12 hours)
Distributed Transactions, Recovery and fault tolerances: Transaction recovery, logging - shadow versions, fault model for transaction; Fault tolerance: characteristics; Hierarchical and group masking of faults; Security, authentication and key distribution, logic of authentication, digital signatures; Web Services: SOAP, XML, CORBA, Distributed object based systems, Distributed file systems, Distributed web- based systems, Distributed co-ordination based systems.

Text Books:
1. George **Coulouris**, Jean **Dollimore**and Tim **Kindberg**, "*Distributed Systems: Concepts and Design*", Fourth Edition, 2006, Pearson Education, Inc. New Delhi.
2. Andrew S. **Tanenbaum**, Maarten **van Steen**, "*Distributed Systems: Principles and Paradigms*", 2nd Edition, 2007, PHI Learning Pvt. Ltd., New Delhi.

Reference Texts:
1. Hagit**Attiya**, Jennifer **Welch**, "*Distributed Computing: Fundamentals, Simulations, and Advanced Topics*", 2nd Edition, 2005, Wiley India Pvt. Ltd., New Delhi.
2. Mordechai**Ben-Ari**, "*Principles of Concurrent and Distributed Programming*", 2nd Edition, 2006, Pearson Education, Inc. New Delhi.

3. Mei-Ling **Liu**, "*Distributed Computing: Principles and Applications*", 2004, Pearson Education, Inc. New Delhi.
4. Gerard **Tel**, "*Introduction to Distributed Algorithms*", Second edition, 2002, Cambridge University Press / Foundation Books India, New Delhi.
5. Ajay D. **Kshemkalyani**, Mukesh**Singhal**, "*Distributed Computing: Principles, Algorithms, and Systems*", 2008, Cambridge University Press / Foundation Books India, New Delhi.

Course Code: CA-15006
Course Name:Parallel Computing

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Module-I (12 hours)
Introduction to Parallel Computing; Motivating Parallelism, Scope of Parallel Computing; Parallel Programming; Platforms : Implicit parallelism, Limitation of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs of Parallel Machines, Routing Mechanism for Interconnection Networks, Impact of Process-processor Mapping and Mapping Techniques.

Module-II (12 hours)
Principles of Parallel Algorithm Design : Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for containing interaction Overheads, parallel Algorithm Models. Analytical Modelling of Parallel Programs : Sources of Overhead in Parallel Programs, Performance metrics for parallel systems, the effect of Granularity on Performance, Scalability of Parallel Systems, minimum Executuion time and minimum cost-optional Execution Time, Asymptotic Analysis of Parallel Programs, other Scalability Metrics.

Module-III (12 hours)
Basic Communication Operations: One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, Scatter and Gather, All-to-All Personalized Communication, Circular Shift.
Introduction to MPI Principles of Message - Passing Programming, The Building Blocks (Send and Receive Operations), MPI (the Message Passing Interface), Collective Communication and Computation Operations, Examples of Matrix - Matrix multiplication, One dimensional Matrix Vector Multiplication using MPI.

Text Books:
1. Ananth**Grama**, George **Karypis**, Vipin**Kumar**, Anshul**Gupta**, "*Introduction to Parallel Computing*", 2nd Edition, 2004, Pearson Education, Inc. New Delhi.
2. Michael J. **Quinn**, "*Parallel Computing: Theory and Practice*", 1994, McGraw-Hill Education (India), New Delhi.

Reference Books:
1. Calvin **Lin**, Larry **Snyder**, "*Principles of Parallel Programming*", 1st Edition, 2009, Pearson Education, Inc. New Delhi.
2. Michael J. **Quinn**, "*Parallel Programming in C with MPI and OpenMP*", 2004, McGraw-Hill Education (India), New Delhi.
3. Barry **Wilkinson**, "*Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers*", 2nd Edition, 2005, Pearson Education, Inc. New Delhi.
4. Yves **Robert**, Henri **Casanova**, Armand **Legrand**, "*Parallel Algorithms*", 1st Edition, 2009, CRC Press. ISBN-13:9781584889458.

5. Harry F. **Jordan**, Gita **Alagband**, *"Fundamentals of Parallel Processing"*, first Edition, 2003, PHI Learning Pvt. Ltd. New Delhi.

Course Code: CA-15007
Course Name:Image Processing

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Module-I (12 hours)
Introduction: The digitized image and its properties: Applications of image processing, image function, image representation, sampling, quantization, color images, metrics and topological properties of digital images, histograms, image quality, noise image.

Module-II (12 hours)
Image preprocessing: Pixel brightness transformation, position dependent brightness correction, gray scale transformation; geometric transformation, local preprocessing- image smoothening, edge detectors, zero-crossing, scale in image processing, canny edge detection, parametric edge models, edges in multi spectral images, local preprocessing and adaptive neighborhood pre processing; image restoration.
Image Segmentation: Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation-edge image thresholding, edge relaxation, border tracing, border detection.

Module-III (12 hours)
Mathematical Morphology: Basic morphological concepts, four morphological principles, binary dilation, erosion, Hit or miss transformation, opening and closing; thinning and skeleton algorithms; Morphological segmentation -particles segmentation and watersheds, particles segmentation.
Image textures: Statistical texture description, methods based on spatial frequencies, co-occurrence matrices, edge frequency, and texture recognition method applications.
Image representation and description: Representation, boundary descriptors, regional descriptors

Text Books:
1. Rafael C. **Gonzalez**, Richard E. **Woods**, "*Digital Image Processing*", 3rd Edition, 2008, Pearson Education, Inc. New Delhi.
2. Milan **Sonka**, Vaclav **Hlavac**, Roger **Boyle**, "*Image Processing, Analysis, and Machine Vision*", 3rd Edition, 2008, CENGAGE Learning, New Delhi.

Reference Book:
1. William K. **Pratt**, "*Digital Image Processing: PIKS Scientific Inside*", 4th Edition, 2008, Wiley India Pvt. Ltd., New Delhi.
2. Bernd **Jähne**, "*Digital Image Processing*", 6th Revised and Extended Edition, 2006, Springer Science. ISBN 978-3-540-24035-8.
3. Anil K. **Jain**, "*Fundamentals of Digital Image Processing*", 1989, PHI Learning Pvt. Ltd. New Delhi.
4. Kenneth R. **Castleman**, "*Digital Image Processing*", 1996, Pearson Education, Inc.
5. Bhabatosh**Chanda**&Dwijesh**Dutta**Majumder, "*Digital Image Processing and Analysis*", First Edition, 2000, PHI Learning Pvt. Ltd., New

Course Code: CA-15008
Course Name:Web Engineering

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Module-I (12 hours)
Web-based Systems, Web Engineering, A Web Engineering Process, Communication, Planning.

Module-II (12 hours)
Modeling Activity, Analysis Modeling For Web Applications, Web Application Design, Interaction Design, and Information Design.

Module-III (12 hours)
Functional Design, Construction and Deployment, Design Patterns, Technologies and Tools, Web Applications Testing, Change and Content Management, Future Directions.

Text Books:
1. Roger S **Pressman**, David **Lowe**, "*Web Engineering: A Practioner's Approach*", 1st Edition, 2008, McGraw Hill Education (India), New Delhi.
2. Emilia **Mendes**, Nile **Mosley**, "*Web Engineering*", 2006, Springer India Pvt. Ltd. New Delhi.

Reference Books:
1. Gustavo **Rossi**, Oscar **Pastor**, Daniel **Schwabe**and Luis **Olsina**, "*Web Engineering: Modeling and Implementing Web Applications*", 2007, Springer India Pvt. Ltd. New Delhi. ISBN: 978-1-84628-922-4.
2. Woojong**Suh**, "*Web Engineering: Principles and Techniques*", IGI Global, 2006, ISBN-13: 978-1591404330
3. Gerti**Kappe**l, Birgit Prýýll, Siegfried Reich, Werner Retschitzegger, "*Web Engineering: The Discipline of Systematic Development of Web Applications*", 2007, John Wiley & Sons Inc. / Wiley India Pvt. Ltd., New Delhi. ISBN-13: 978-0470015544
4. Daniel M. **Brandon**, "*Software Engineering for Modern Web Applications: Methodologies and Technologies*", IGI Global, 2009, ISBN-13: 978-1599044927.

Course Code: CA-15009
Course Name:Computer Security

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Module-I (12 hours)
The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense; Elementary Cryptography: Substitution Ciphers, Transpositions, Making "Good" Encryption Algorithms, Private-Key Cryptosystems, The Data Encryption Standard, The AES Encryption Algorithm, Public-Key Cryptosystems, Public Key Encryptions, Uses of Encryption, Pseudo-randomness, and Hashing.

Module-II (12 hours)
Program Security : Secure Programs, Non-malicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats, Protection in General-Purpose operating system protected objects and methods of protection memory and address protection, File protection Mechanisms, User Authentication Designing Trusted O.S : Security polices, models of security, trusted O.S. design, Assurance in trusted OS, Implementation examples.
Digital Signatures, Authentication, Secret Sharing, Group-oriented cryptography, Identification.

Module-III (12 hours)
Data base & Network Security: Security requirements, Reliability and integrity, Sensitive data, Inference, multilevel database, proposals for multilevel security; Security in Network; Threats in Network, Network Security Controls, Firewalls, Intrusion Detection Systems, Secure E-mail.
Administering Security: Security Planning, Risk Analysis, Organizational Security policies, Physical Security; The Economics of Cyber security; Privacy in Computing; Legal and Ethical Issues in Computer Security: Protecting Programs and data, Information and the law, Rights of Employees and Employers, Software failures, Computer Crime, Case studies of Ethics.

Textbooks:
1. Charles P. **Pfleeger**& Shari Lawrence **Pfleeger**, "*Security in Computing*", Fourth Edition, 2007, Pearson Education, Inc. New Delhi.
2. Josef **Pieprzyk**, Thomas **Hardjono**, Jennifer **Seberry**, "*Fundamentals of Computer Security*", 2003, Springer & Universities Press India, New Delhi.

Reference Books:
1. Dieter **Gollmann**, "*Computer Security*", Second Edition, 2006, Wiley India Pvt. Ltd., New Delhi.
2. William **Stallings** &Lawrie**Brown**, "*Computer Security: Principles and Practice*", First Edition, 2008, Pearson Education, Inc. New Delhi.
3. Charlie **Kaufman**, Radia**Perlman** & Mike **Speciner**, "*Network Security: Private Communication in a Public World*", 2nd Edition, 2003, PHI Learning. New Delhi.

4. Chuck **Easttom**, "*Computer Security Fundamentals*", First Edition, 2006, Pearson Education, Inc. New Delhi.

5. Alfred **Baasta**, "*Computer Security*", First edition, 2008, CENGAGE Learning.

Course Code: CA-15010
Course Name:Software Design

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Module-I (12 hours)
Software Architecture: Introduction, Architectural Styles, Shared Information Systems, Architectural Design Guidance, Formal Models and Specifications, Linguistic Issues.
Role of Software Design: Nature of the Design Process, Software Design Process, Design in the Software Development Process, Design Qualities.

Module-II (12 hours)
Transferring Design Knowledge: Describing a Design Solution, Transferring Design Knowledge, Design Representations, and Rationale for Method, Design Processes and Design Strategies, Design Patterns.

Module-III (12 hours)
Design Principles: Correctness and Robustness, Flexibility, Reusability, and Efficiency.
Design Practices: Stepwise Refinement, Incremental Design, Structured Systems Analysis and Structured Design, Jackson Structured Programming, Jackson System Development, Designing with Objects, Component-Based Design, Formal Approach to Design.

Text Books:
1. Mary **Shaw**, David **Garlan**, "*Software Architecture: Perspectives on an Emerging Discipline*", 2005, PHI Learning Pvt. Ltd, New Delhi.
2. David **Budgen**, "*Software Design*", 2nd Edition, 2004, Pearson Education Inc. New Delhi.

Reference Books:
1. Eric J. **Braude**, "*Software Design: From Programming to Architecture*", 2004, Wiley India Pvt. Ltd., New Delhi.
2. Nick **Rozanski**, Eóin**Woods**, "*Software Systems Architecture: Working With Stakeholders Using Viewpoints and Perspectives*", 2006, Pearson Education, Inc. New Delhi.
3. Len **Bass**, Paul **Clements**, Rick **Kazman**, "*Software Architecture in Practice*", 2nd Edition, 2004, Pearson Education, Inc. New Delhi.
4. Hong **Zhu**, "*Software Design Methodology: From Principles to Architectural Styles*", 2006, Butterworth-Heinemann / Elsevier India Pvt. Ltd., New Delhi.
5. Richard N. **Taylor**, Nenad**Medvidovic**, Eric **Dashofy**, "*Software Architecture: Foundations, Theory, and Practice*", 2009, Wiley India Pvt. Ltd., New Delhi

Course Code: CA-15011
Course Name:Bioinformatics

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Module-I (12 hours)

Molecular Biology and Biological Chemistry: The Genetic Material, Gene structure and Information Content, Protein Structure and Function, The nature of Chemical bonds, Molecular Biology Tools, Genomic Information Content, *Data Searches and Pairwise Alignments*: Dot Plot, Simple Alignments, Gaps, Scoring Matrices, Needleman and Wunsch Algorithm, Global and local Alignments, Database searches, Multiple sequence Alignments, *Substitution Patterns*: Patterns of substitutions within Genes, Estimating Substitution numbers, Variations in evolutionary rates between Genes, Molecular clocks, evolution in Organelles.

Module-II (12 hours)

Distance based methods of Phylogenetics: History of Molecular Phylogenies, Phylogenetic trees, Distance matrix methods, Maximum likelihood approaches, Multiple sequence Alignments, *Character Based methods of Phylogenetics*: Parsimony, Inferred ancestral sequences, Strategies for Faster searches, Consensus trees, tree confidence, Comparison of Phylogenetic methods, Molecular Phylogenies.

Module-III (12 hours)

Genomics and Gene Recognition: Prokaryotic genomes, Prokaryotic gene structure, GC-content Prokaryotic genomes, Prokaryotic gene density, Eukaryotic genomes, Eukaryotic gene structure, Open reading frames, GC-content Eukaryotic genomes, Gene expression, Transposition, Repetitive elements, Eukaryotic gene density, *Protein and RNA structure prediction*: Amino acids, Polypeptide composition, Secondary structure, Tertiary and quaternary structure, Algorithms for Modeling Protein Folding, Structure prediction, Predicting RNA secondary structures, *Proteomics*: from Genomes to Proteomes, Protein classification, Experimental techniques, Inhibitors and drug design, Ligand screening, X-ray crystal structures, NMR structures, Empirical methods and prediction techniques, Postranslational modification prediction.
.
Text Books:
1. Dan E. **Krane**, Michael L. **Raymer**, "*Fundamental Concepts of Bioinformatics*", First Edition, 2003, Pearson Education, Inc. New Delhi.
2. Teresa **Attwood**, David **Parry-Smith**, "*Introduction to Bioinformatics*", 1999, Pearson Education, Inc. New Delhi.

Reference Books:
1. *Shuba**Gopal**, A. **Haake**, R. P. **Jones**, P. **Tymann**, "Bioinformatics: A Computing* Perspective", First Edition, 2009, McGraw-Hill Education (India), New Delhi.
2. Yi-Ping P. **Chen**, "*Bioinformatics Technologies*", 2006, Springer India Pvt. Ltd., New Delhi.
3. Arthur **Lesk**, "*Introduction to Bioinformatics*", 2009, Oxford University Press, ISBN-13: 978-0199208043.

4. Bryan **Bergeron**, "*Bioinformatics Computing*", 2003, PHI Learning. New Delhi.

5. Zoe Lacroix, Terence Critchlow, "*Bioinformatics: Managing Scientific data*", 2009, Elsevier India Pvt. Ltd., New Delhi.

Course Code: CA-15012
Course Name:Soft Computing

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Module-I (10 hours)
Introduction to intelligent systems and soft computing: Introduction, Intelligent systems, Knowledge-based systems, Knowledge representation and processing, soft computing.
Fundamentals of fuzzy logic systems: Introduction, background, fuzzy sets, generalized fuzzy operations, implication, definitions, fuzziness and fuzzy resolution, fuzzy relations, composition and inference, considerations of fuzzy decision making.

Module-II (10 hours)
Fundamentals of artificial neural networks: introduction, learning and acquisition of knowledge, features of artificial neural networks, fundamentals of connectionist modeling. Classes of neural networks: introduction, multilayer perceptron, radial basis function networks, Kohonen's self-organizing network, Hopfield network, industrial and commercial applications of ANN.

Module-III (10 hours)
Neuro-fuzzy systems: introduction, background, architectures of neuro-fuzzy systems, construction of Neuro-fuzzy systems. Evolutionary computing: introduction, overview, genetic algorithms and optimization, the schema theorem, genetic algorithm operators, integration of genetic algorithms with neural networks, integration of genetic algorithms with fuzzy logic, known issues in GAs, population-based incremental learning, evolutionary strategies, ES applications.

Text Books:
1. Fakhreddine O. **Karray**, Clarence **De Silva**, "*Soft Computing and Intelligent Systems Design: Theory, Tools and Applications*", Pearson Education, New Delhi.
   Chapters: 1, 2, 4, 5, 7 and 8.
2. Jyh-Shing Roger **Jang**, Chuen-Tsai **Sun**, Eiji**Mizutani**, "*Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence*", 1996, PHI Learning Pvt. Ltd. New Delhi.

Reference Books:
1. S. N. **Sivanadam**, S. N. **Deepa**, "*Principles of Soft Computing*", First Edition, 2008, Wiley India Pvt. Ltd. New Delhi.
2. *Frank **Hoffmann**, M. **Köppen**, F. **Klawonn**, R. **Roy***, "*Soft Computing:* Methodologies and Applications", 2006, Springer, New Delhi.
3. D. K. **Prathihar**, "*Soft Computing*", 2007, Narosa Publication, New Delhi.
4. A. K. **Srivastava**, "*Soft Computing*", 2009, Morgan & Claypool / Narosa, New Delhi.
5. N. K. **Sinha**, "*Soft Computing and Intelligent Systems: Theory and Applications*", 2009, Elsevier India Pvt. Ltd, New Delhi.

Course Code: CA-15013
Course Name:Assignment *

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Topics:
01. Developing the Building blocks of UML: things, relationships and diagrams.
02. Generating the Following through UML:

        a) Class diagram
        b) Object diagram
        c) Use case diagram
        d) Sequence diagram
        e) Collaboration diagram
        f) Activity diagram
        g) Statechart diagram
        h) Component diagram
        i) Deployment diagram

03. Design the following systems through UML:

        a) OnlineBookShop Management System
        b) Bank Management System
        c) Library Management System
        d) University Management System
        e) Railway Information System

Course Code: CA-15014
Course Name:Lab – X (Enterprise Web Computing Java Lab.)

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Topics:
01. HTML & XHTML Programming: basic tags, text formatting tags, creating hyperlinks.
02. HTML & XHTML Programming: tables, lists, frames, forms, maps, Creating CSS.
03. JavaScript Programming: Data types, loops, functions.
04. JavaScript Programming: DOM, arrays, forms, frame, GUI design.
05. XML Programming: page creation, making a DTD, Parsing XML files.
06. Creating, installation and running a web server (e.g. Apache Tomcat/ GlassFish).
07. Creating, Compiling and Running a Servlet. Program (both http & generic servlet).
08. Implementing session tracking mechanisms in servlets.
09. Generating Dynamic web content using Servlet basing upon request response model.
10. DHTML programming: GUI designs.
11. Creating a JSF program showing framework based application development.
12. Creating, Compiling and Running a JSP Program.
13. Implementing Session tracking through JSP Program.
14. Access to a database using Servlet/JSP program.
15. Creating a simple Java Bean Application programs using BDK. Tools.
16. Deploying of beans, implementing entity beans and session beans of EJB.
17. Creating manifest file, jar file and Deploying a web application.
18. Designing a simple Program using JDBC, beans and JSP implementing MVC Model.
19. Creating a RMI Program showing Marshalling and Unmarshalling Processes.
20. A Web based Capstone project university management system using JSP and Database..

Course Code: CA-16001
Course Name:Project work for 16 weeks**

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There will be a 16 weeks project work to be undertaken by the students in any Industry / Institution. At the end of the project there will an evaluation of the project for 20 credits by a group of experts including one external expert, internal supervisor and teachers of the department.

Each student must have an internal supervisor who is a faculty of the department/ Institution. Each student must submit the abstract of the project which will be approved by the department on the recommendation of the internal supervisor. .

Guidelines: SUMMARY/ABSTRACT
All students must submit a summary/abstract of the project to be undertaken to the internal supervisor for approval, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up should include the followings-
    1. Name / Title of the Project
    2. Statement about the Problem
    3. Why is the particular topic chosen?
    4. Objective and scope of the Project
    5. Methodology (including a summary of the project)
    6. Hardware & Software to be used
    7. Testing Technologies used
    8. What contribution would the project make?

After the approval, the student is allowed to carry out the project in any organization/ Institution. He/She must immediately inform the internal supervisor about the name and contact details of the external supervisor in the organization/Institution. Moreover he must report to the internal supervisor about the progress of his/her work periodically. After the end of 16 weeks, the student is required to submit the project report in the department after getting approved by the internal and external supervisors.

Guidelines for preparation of the final project report
Good quality white executive bond paper of A4 size should be used for typing and duplication with the following specification
Left margin : 3.0cm
Right margin : 2.0cm
Top margin : 2.5cm
Bottom margin : 2.5cm
Page numbers: All text pages as well s the Program source code should be numbered in the bottom center of the pages.
Font size of the normal Text :12pt Times New Roman
Font size of Paragraph Heading :14pt Times New Roman
Font Size of chapter Heading :18pt Times New Roman

Font size of Code :10pt Courier New

Format of the Project report
Cover page
Certificate of the internal supervisor
Certificate of the external supervisor
Self certificate
Acknowledgement
List of abbreviations, figures, Tables
Synopsis of the project (3-4 pages)

Main Report
Objective and scope of the project
Theoretical background
Definition of the problem
System Analysis and design
System planning
Methodology adopted
System implementation
System maintenance and Evaluation
Cost benefit Analysis
        Detail life cycle of the project
Test reports (print out of the reports)
Print out of the code
References
Every student has to submit the followings

   (a) One hard copy of the Project report
   (b) Soft copy of the project on CD(to be submitted to the Universiy) on a cover mentioning the
        name of the project, name of the student, Regd No. , name of the college, Year
   (c) Five copies of the synopsis of the project report

Evaluation of the Project
Evaluation of the project will be done by a jury of experts including one external expert,
Head of the Department, internal supervisor, two teachers of the department. The evaluation
will be done on the basis of the followings

Presentation : 30 Percentile
Viva-Voce : 20 Percentile
Project report : 50 Percentile

Number of students in a project should not be more than one. In some cases if the project
completion needs more than 16 weeks, then two students may be allowed on the
recommendation of the supervisors. However, they should handle different modules of the
project.
                              ****