

**ANNA UNIVERSITY OF TECHNOLOGY COIMBATORE**  
**CURRICULAM AND SYLLABI - REGULATIONS – 2007**  
**M.SC. SOFTWARE ENGINEERING (5 YEARS)**

**SEMESTER I**

Course Code	Course Title	L	T	P	C
<b>THEORY</b>					
073020001	Technical English - I	4	0	0	4
073030001	Applied Mathematics - I	3	1	0	4
073230007	Digital Principles	4	0	0	4
073230001	Computer Concepts & Problem Solving	4	0	0	4
073230021	Programming in C	3	1	0	4
<b>PRACTICALS</b>					
073230009	Digital Laboratory	0	0	3	1.5
073230002	Computer Concepts and Problem Solving Laboratory	0	0	3	1.5
073230003	C Programming Laboratory	0	0	3	1.5
<b>Total Credits</b>					<b>26</b>

**SEMESTER – II**

Course Code	Course Title	L	T	P	C
<b>THEORY</b>					
073020003	Technical English - II	3	0	0	3
073230012	Object Oriented Programming	3	1	0	4
073230036	Introduction to Software Engineering	4	0	0	4
073230013	Computer Architecture	3	1	0	4
073230008	Data Structures	3	1	0	4
<b>PRACTICALS</b>					
073230024	Software Engineering Laboratory	0	0	3	1.5
073230014	Object Oriented Programming Laboratory	0	0	3	1.5
073230010	Data Structures Laboratory	0	0	3	2
<b>Total Credits</b>					<b>26</b>

**SEMESTER – III**

Course Code	Course Title	L	T	P	C
<b>THEORY</b>					
073030004	Mathematical Structures	3	1	0	4
073230026	Operating Systems	4	0	0	4
073250011	Database Management Systems	4	0	0	4
073250004	Design and Analysis of Algorithms	3	1	0	4
073230028	Microprocessors and Interfacing	3	1	0	4
<b>PRACTICALS</b>					
073230011	Operating Systems Laboratory	0	0	3	1.5
073230017	Database Management Systems Laboratory	0	0	3	1.5
073230025	Microprocessors and Interfacing Lab	0	0	3	2
<b>Total Credits</b>					<b>26</b>

### SEMESTER – IV

Course Code	Course Title	L	T	P	C
<b>THEORY</b>					
073030010	Probability and Statistics	4	0	0	4
073250018	Java Programming	3	1	0	4
073230044	Object Oriented Analysis and Design	3	1	0	4
073250019	Computer Networks	4	0	0	4
	Elective I	4	0	0	4
<b>PRACTICALS</b>					
073250021	Java Programming Laboratory	0	0	3	1.5
073230045	CASE Tools Laboratory	0	0	3	1.5
073250020	Computer Networks Laboratory	0	0	3	1.5
<b>Total Credits</b>					<b>26</b>

### SEMESTER – V

Course Code	Course Title	L	T	P	C
<b>THEORY</b>					
073250027	Web Technology	4	0	0	4
073650009	Software Testing	3	1	0	4
073250022	Multimedia Systems	3	1	0	4
	Elective II	4	0	0	4
	Elective III	4	0	0	4
<b>PRACTICALS</b>					
075580004	Web Technology Lab	0	0	3	2
075580005	Software Testing Lab	0	0	3	2
075580006	Multimedia Systems Lab	0	0	3	2
<b>Total credits</b>					<b>26</b>

### SEMESTER – VI

Course Code	Course Title	L	T	P	C
<b>THEORY</b>					
075230021	Software Quality Assurance	3	0	0	3
075230028	Distributed Component Architecture	3	1	0	4
075250015	Open Source Computing	4	0	0	4
075250030	Software Requirements Management	3	1	0	4
	Elective IV	4	0	0	4
<b>PRACTICALS</b>					
075580013	Distributed Component Architecture Lab	0	0	3	2
075580014	Software Lab	0	0	3	2
<b>Total Credits</b>					<b>23</b>

### SEMESTER – VII

Course Code	Course Title	L	T	P	C
075580016	Project Work - 1	0	0	24	12
<b>Total Credits</b>					<b>12</b>

**SEMESTER – VIII**

<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
073250028	Embedded Systems	3	1	0	4
075230038	Software Metrics	4	0	0	4
075230039	Advanced Java Programming	3	1	0	4
	Elective V	3	0	0	3
	Elective VI	3	0	0	3
<b>PRACTICALS</b>					
075250008	Embedded Systems Lab	0	0	3	2
075230040	Advanced Java Programming Lab	0	0	3	2
<b>Total credits</b>					<b>22</b>

**SEMESTER – IX**

<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
075250023	Management Information Systems	3	0	0	3
075580018	Enterprise Resource Planning	3	0	0	3
075580019	Software Reuse	3	1	0	4
	Elective VII	3	0	0	3
	Elective VIII	3	0	0	3
<b>PRACTICALS</b>					
075580020	Enterprise Resource Planning Lab	0	0	3	2
075580021	Software Reuse Lab	0	0	3	2
<b>Total Credits</b>					<b>20</b>

**SEMESTER – X**

<b>Code No.</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>M</b>
<b>THEORY</b>					
	Project work - II	0	0	24	12
<b>Total Credits</b>					<b>12</b>

**TOTAL CREDITS TO BE EARNED FOR THE AWARD OF THE DEGREE =**

**LIST OF ELECTIVES FOR M.Sc. - SOFTWARE ENGINEERING (5 YEARS)**

<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>SEMESTER IV</b>					
073580006	Software Project Management	4	0	0	4
073580002	Software Communication and Documentation	4	0	0	4
073250023	Client Server Computing	4	0	0	4
073580003	Personal Software Process and Team Software Process	4	0	0	4
<b>SEMESTER V</b>					
073580010	Software Agents	4	0	0	4
073580011	Real Time Systems	4	0	0	4
073580012	Component Based Development	4	0	0	4
073580013	User Interface Design	4	0	0	4
075580011	Network Security & Cryptography	4	0	0	4
073250033	Service Oriented Architecture	4	0	0	4
<b>SEMESTER VI</b>					
075230024	Unix and Network Programming	4	0	0	4
075230027	Advanced DBMS	4	0	0	4
075230029	Distributed Operating Systems	4	0	0	4
075230030	Software Reliability	4	0	0	4
<b>SEMESTER VIII</b>					
075230041	Software Design	3	0	0	3
075230042	Data Warehousing	3	0	0	3
075230043	Architecture of Unix & Windows	3	0	0	3
075230044	Middleware Technologies	3	0	0	3
075230033	Extreme Programming	3	0	0	3
075230022	Compiler Design	3	0	0	3
<b>SEMESTER IX</b>					
075580022	Cryptography	3	0	0	3
075580023	Parallel Computing	3	0	0	3
075580024	C# and .NET Programming	3	0	0	3
075580027	Soft Computing	3	0	0	3
075230023	Artificial Intelligence	3	0	0	3
073230050	Professional Ethics	3	0	0	3



073030001

APPLIED MATHEMATICS – I

L	T	P	C
3	1	0	4

**UNIT – I STATISTICAL MEASURES, LINEAR REGRESSION AND CORRELATION (12)**

Summarization of uni and multi dimensional data-frequency distribution-Measures of central tendency: mean, median- mode.- Measures of dispersion. Regression lines-Regression coefficients – Correlation coefficients-rank correlation and simple problems.

**UNIT – II MATRICES (12)**

Rank of a matrix – Consistency of linear system of equations – Eigen value problem – Eigenvalues and eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley –Hamilton theorem (without proof) – Reduction of quadratic form to canonical form by orthogonal transformation.

**UNIT – III SOLUTION OF NON-LINEAR & SIMULTANEOUS EQUATIONS (12)**

Solution of non-linear equations using method of Bisection-Method of false position-Newton Raphson's method-simple problems. Solution of simultaneous linear equations using Gauss method – Gauss Jordan method - Gauss Jacobi method – Gauss Seidel method –Simple problems

**UNIT – IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION (12)**

Newton – Gregory forward interpolation formula-Newton – Gregory backward interpolation formula for equally distributed data- Newton's divided difference method for unequally distributed data. Numerical differentiation using Newton's forward and backward difference formula. Numerical Integration using Simpson's 1/3rd rule - Simpson's 3/8th rule - Trapezoidal rule.

**UNIT – V SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (12)**

Taylor's method, Picard's method-Euler's method & Modified Euler's method - Runge Kutta method – fourth order-Milne and Adams Predictor and corrector method - Simple problems.

**LECTURE: 45 TUTORIALS: 15 TOTAL : 60**

**REFERENCE BOOKS :**

1. S.C. Gupta and V.K. Kapoor “Fundamentals of Mathematical Statistics”, Sultan Chand & Sons, New Delhi.
2. Kandasamy.P., Thilagavathy.K. and Gunavathy.K. – “Engineering Mathematics, Volume – I”, S.Chand & Co., New Delhi, 2001.

**073230007**

**DIGITAL PRINCIPLES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT – I (12)**

Binary Systems : Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic Boolean Algebra and Logic Gates: Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates.

**UNIT – II (12)**

Minimization: K-Map Method – Table Method, POS - SOP, Don't Care Conditions, NAND, NOR Implementation, Introduction to HDL. Combinational Logic: Combinational Circuits, Analysis and Design Procedure, Binary Adder, Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

**UNIT – III (12)**

Synchronous Sequential Logic: Sequential Circuits - Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction – Applications of flip - flops.

**UNIT – IV (12)**

Registers and Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counters-Johnson Counter.

**UNIT – V (12)**

Asynchronous Sequential Circuit : Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of State and Flow Tables. Digital Integrated circuits: Introduction – special characteristics Bipolar – Transistor Characteristics.

**TOTAL: 60**

**REFERENCES:**

1. M.Morris Mano, "Digital Design", 3rd edition, Pearson Education, Delhi, 2007.
2. Donald P Leech, Albert Paul Malvino and Goutam Saha, "Digital Principles and Applications", Tata Mc Graw Hill, 2007.

**073230001          COMPUTER CONCEPTS & PROBLEM SOLVING          L   T   P   C**  
**4   0   0   4**

**UNIT – I          FUNDAMENTALS OF COMPUTERS          (12)**  
Evolution of Computers – Inputs/Outputs – Organization of Modern Digital Computers - Processor and memory – Operating System – Network Topologies – Graphical user Interface.

**UNIT – II          WORD PROCESSING          (12)**  
Word Processing Programs and Their Uses – Word Processor’s Interface – Editing Text – Formatting Text –Macro- Special Features of Word – Desktop Publishing Service – Converting doc into www pages

**UNIT – III          SPREADSHEET SOFTWARE          (12)**  
Spreadsheet Programs – applications – Spreadsheet package features, attributes -structure, label, data, importing data, formula, functions – data handling – Managing Workbooks.

**UNIT – IV          INTRODUCTION TO COMPUTER PROBLEM SOLVING          (12)**  
Introduction – Problem Solving aspects-Top-Down Design-Implementation of Algorithms – Program Verification. Verification of program segments - Efficiency of Algorithms-Analysis of Algorithm fundamental Algorithm - factorial computation-generation of Fibonacci sequence.

**UNIT – V          FACTORING AND ARRAY TECHNIQUES          (12)**  
Factoring Methods-finding the square root of a number-generating prime numbers- Array techniques-array order reversal-Finding the maximum number in a set- Removal of duplicates from an ordered Array-finding the kth smallest element.

**TOTAL: 60**

**REFERENCES:**

1. Peter Norton, “Introduction to Computers”, 3<sup>rd</sup> Edition, TMH Ltd, New Delhi, 2001.
2. R.G. Dromey, “How to solve it by Computers”, Pearson Publishers, New Delhi, 2007.

073230021

**PROGRAMMING IN C**

**L T P C**  
**3 1 0 4**

**UNIT I INTRODUCTION TO C LANGUAGE (12)**

Overview of 'C' language – Constants, Variables and Data Types – Operators, Expressions and Assignment statements – Managing Input/Output Operations –Formatted I/O – Decision Making - Branching – IF, Nested IF – Switch – go to -Looping- While, do, for statements.

**UNIT II ARRAYS AND FUNCTIONS (12)**

Arrays – dynamic and multi-dimensional arrays - Character arrays and Strings –String handling Functions - User defined Functions – Categories of Functions –Recursion.

**UNIT III STRUCTURES AND UNIONS (12)**

Basics of Structures-Declaring a Structure – Array of Structures –Passing Structure elements to Functions- Passing entire Structure to Function – Structures within Structures - Union – Union of Structures – Enumerated Data Types – type of Statement.

**UNIT IV POINTERS (12)**

Pointers – Declaration, Accessing a variable, dynamic memory allocation, Pointers versus Arrays, Array of pointers, Pointers to functions and structure Pointers.

**UNIT V FILE MANAGEMENT (12)**

File Management in C – Data hierarchy- Files and Streams – Sequential access file-Random access file - Preprocessors.

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. V.Rajaraman “Computer Programming in C” PHI, New Delhi, 2001
2. Kamthane, A.N., “Programming with ANSI and Turbo C”, Pearson Education, Delhi, 2006.
3. Yashavant P. Kanetkar “ Pointers In C” , BPB Publications, New Delhi, 2002
4. E.Balagurusamy “ Programming in ANSI C ” , Tata McGraw Hill, 2004
5. Deitel and Deitel “ C How to Program ”, Addison Wesley , 2001

**073230009**

**DIGITAL LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**LIST OF EXERCISES**

1. Binary and BCD counter
2. Verification of NAND, NOR, XOR, AND, OR Gate Logic
3. Parity Generator
4. Multiplexer / Demultiplexers
5. Adder / Subtractor
6. Code Converters
7. Up / Down 4 bit Binary Counter
8. Up / Down 4 bit Decimal Counter
9. Shift Register
10. Ring Counter

**TOTAL: 45**

**073230002      COMPUTER CONCEPTS AND PROBLEM SOLVING  
LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**LIST OF EXERCISES**

1. Word Processing
2. Spreadsheet
3. Power point
4. Factorial
5. Fibonacci
6. Prime Generation
7. Removal of duplicates from an ordered Array
8. Finding the kth smallest element.

**TOTAL: 45**

**073230003**

**C PROGRAMMING LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**LIST OF EXERCISES**

Implementation of

1. Input / output function
2. Control Functions
3. Functions
4. Arrays
5. Pointers
6. Structures and Unions
7. Files

Using case studies on: Roots of a quadratic equation, Measures of location –Matrix Operations – Evaluation of trigonometric functions – Pay roll problems. String operations like substring, concatenation, finding a string from a given Paragraph, finding the number of words in a paragraph.

**TOTAL: 45**



073230012

**OBJECT ORIENTED PROGRAMMING**

L	T	P	C
3	1	0	4

**UNIT I**

**(12)**

**PRINCIPLES OF OOP:** Software Crisis. Software Evolution .Programming Paradigms. Object Oriented Technology – Basic concepts and benefits of OOP . Application of OOP, OOP languages.

**INTRODUCTION TO C++:** History of C++ , structure of C++, application of C++ ,tokens, keywords, identifiers, basic data types, derived data types, derived data types, symbolic constant, dynamic initialization, reference variables, scope resolution oprator,type modifiers, type casting operators and control statements, input and output statements in C++, function prototyping, function components, passing parameters call by reference, return by reference, inline function, default arguments, over loaded function introduction friend function .

**UNIT – II**

**(12)**

**CLASSES AND OBJECTS:** Class specification, Member function definition, nested member function, access qualifiers, static data members and, member functions. Instance creation. Array of objects. Dynamic objects, Static Objects, Objects as arguments. Returning objects. **CONSTRUCTORS AND DESTRUCTORS:** Constructors- Parameterized constructors, Overloaded Constructors, Constructors with default arguments, copy constructors, Dynamic Constructors, dynamic initialization using Constructors. Destructors.

**UNIT – III**

**(12)**

**OPERATOR OVERLOADING:** Operator function-overloading unary and binary operators, overloading the operator using Friend function, Stream operator overloading, Data conversion.

**INHERITANCE:** Defining derived classes. Single Inheritance-Protected data with private inheritance. Multiple Inheritance. Multi Level Inheritance. Hierarchical Inheritance. Hybrid Inheritance. Multipath Inheritance .Constructors in derived and base Class. Template in Inheritance. Abstract classes. Virtual function and Dynamic polymorphism. Virtual destructor. Nested Classes.

**UNIT – IV**

**(12)**

**FUNCTIONS IN C++ :** Virtual functions- need for Virtual function, Pointer to derived class objects, Definition of Virtual functions, Array of Pointer to base class objects, Pure Virtual functions , Abstract classes , Virtual Destructors, Generic Programming with Templates. Introduction, function templates, overloaded function templates, user defined templates arguments, class templates, Inheritance of class templates.

**UNIT – V**

**(12)**

**STREAMS:** Streams in C++, Stream classes, formatted and unformatted data, Manipulators, User defined Manipulators, file stream, file pointer and manipulation, file open and close, sequential and random access.

**EXCEPTION HANDLING:** Principle of Exception handling, Exception handling mechanism, Multiple catch, Nested try, rethrowing the Exception.

**L:45 T:15 TOTAL : 60**

## REFERENCES:

1. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publication Pvt. Ltd, 4<sup>th</sup> edition, New Delhi, 2002
2. Herbert Schildt, "C++ : The Complete Reference", TMH, New Delhi, 2003.
3. Ashok N Kamathane, "Object Oriented Programming with ANSI & Turbo C++", Pearson Education, New Delhi, 2003.
4. Bjarne Stroustrup, "C++ Programming language", Pearson Education, New Delhi, 2001.
5. Stanley B Lippman and Josee Lajoie, "C++ Primer", Pearson Education, ND, 2001.
6. Venugopal K R, Rajkumar Buyya and Ravishankar T, "Mastering C++", TMH, ND, 2006.



**073230013**

**COMPUTER ARCHITECTURE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**UNIT – I BASIC STRUCTURE OF COMPUTERS (12)**

Functional units - Basic operational concepts - Bus structures – Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.

**UNIT – II ARITHMETIC UNIT (12)**

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.

**UNIT – III BASIC PROCESSING UNIT (12)**

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.

**UNIT – IV MEMORY SYSTEM (12)**

Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage.

**UNIT – V I/O ORGANIZATION (12)**

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition “Computer Organization”, McGraw-Hill, 2002.
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 6th Edition, Pearson Education, 2003.
3. David A.Patterson and John L.Hennessy, “Computer Organization and Design: The hardware / software interface”, 2nd Edition, Morgan Kaufmann, 2002.
4. John P.Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw Hill, 1998.



**073230024**

**SOFTWARE ENGINEERING LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**LIST OF EXERCISES**

1. Practice requirements elicitation
2. Practice requirement analysis and project plan
3. SRS Documentation
4. Cost estimation models
5. Practice design techniques using case tools.
6. Simulate Software architectural components.
7. Generation of test cases for testing
8. Unit testing
9. Integration testing
10. Creating software documentation for all the phases of software life cycle development.

**Note:** All the above exercises are to be carried out by using any real time application such as Library Management System, Payroll processing, Hospital management system, Inventory management etc.,. Any other application indicated by the Instructor can also be used.

**TOTAL: 45**

**073230014**

**OBJECT ORIENTED PROGRAMMING  
LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**LIST OF EXERCISES**

1. Implementation of Classes and Objects
2. Implementation of Function Overloading
3. Implementation of Inline function
4. Implementation of Call by Value and Call by reference
5. Implementation of Function Overloading
6. Implementation of Static data and member function
7. Implementation of Objects as arguments
8. Implementation of Array of Objects
9. Implementation of Static and Dynamic Objects
10. Implementation of Constructor and Destructor
11. Implementation of Overloading Unary operators
12. Implementation of Overloading Binary operators
13. Implementation of Operator Overloading using friend function
14. Implementation of Data conversion
15. Implementation of all types of Inheritance
16. Implementation of Virtual functions
17. Implementation of Template functions and template class
18. Implementation of Sequential and Random accessing of Files
19. Implementation of Exception Handling mechanism

**TOTAL: 45**

073230010

DATA STRUCTURES LABORATORY

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**LIST OF EXERCISES**

**Implement the following exercises using C:**

1. Array implementation of List Abstract Data Type (ADT)
2. Linked list implementation of List ADT
3. Cursor implementation of List ADT
4. Array implementations of Stack ADT
5. Linked list implementations of Stack ADT

**THE FOLLOWING THREE EXERCISES ARE TO BE DONE BY IMPLEMENTING THE FOLLOWING SOURCE FILES**

- A. Program for ‘Balanced Paranthesis’
- B. Array implementation of Stack ADT
- C. Linked list implementation of Stack ADT
- D. Program for ‘Evaluating Postfix Expressions’

An appropriate header file for the Stack ADT should be #included in (a) and (d)

6. Implement the application for checking ‘Balanced Paranthesis’ using array implementation of Stack ADT (by implementing files (a) and (b) given above)
7. Implement the application for checking ‘Balanced Paranthesis’ using linked list implementation of Stack ADT (by using file (a) from experiment 6 and implementing file (c))
8. Implement the application for ‘Evaluating Postfix Expressions’ using array and linked list implementations of Stack ADT (by implementing file (d) and using file (b), and then by using files (d) and (c))
9. Queue ADT
10. Search Tree ADT - Binary Search Tree
11. Heap Sort
12. Quick Sort

**TOTAL: 45**

### SEMESTER – III

073030004

MATHEMATICAL STRUCTURES

L	T	P	C
3	1	0	4

**UNIT I SET THEORY**

12

Set theory: set notations basic set operations - Venn diagram - laws of set theory principles of inclusion and exclusion - partition - minsets – mathematical induction.

**UNIT II PROPOSITIONAL CALCULUS**

12

Propositions - Truth table-logical operators – Tautologies and contradiction- Logical equivalences and implications- laws of logic - normal forms- proofs in propositional calculus- Direct proof- conditional conclusion – indirect proof- Inconsistent set of premises.

**UNIT III PREDICATE CALCULUS**

12

Predicates- statement function – variables and quantifiers- Predicate formulae- Free and bound variables- The Universe of discourse- logical implications and equivalence for quantified statements- Theory of inference of predicate calculus.

**UNIT IV RELATIONS AND FUNCTIONS**

12

Relations- Properties of relations- Equivalence relation- composition of relations- closure operations on relations- Functions-Injective, surjective, bijective functions- composition of functions – inverse functions.

**UNIT V FORMAL LANGUAGES AND AUTOMATA**

12

Four classes of grammars- Types of grammars-normal forms-Derivation trees- ambiguous and unambiguous grammars- finite state automata (FSA)- nondeterministic finite state automata(NFSA)- conversion of non-deterministic automata to deterministic finite state automata. Acceptance of a regular set by an FSA construction of a right linear grammar from a finite automata.

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Kenneth H.Rosen, “ Discrete Mathematics and its Applications”, Tata Mc Graw Hill, Fourth Edition, 2002.
2. J.P.Tremblay and Manohar , “ Discrete Mathematical Structures with Applications to computer Science “, TMH ,1997.

**UNIT I INTRODUCTION (12)**

Introduction - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.

**UNIT II THREADS (12)**

Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

**UNIT III SYSTEM MODEL (12)**

System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

**UNIT IV VIRTUAL MEMORY (12)**

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection

**UNIT V FILE SYSTEM STRUCTURE (12)**

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management. Case Study: The Linux System, Windows

**TOTAL : 60****REFERENCES:**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, Sixth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.
2. Harvey M. Deitel, “Operating Systems”, Second Edition, Pearson Education Pvt. Ltd, 2002.
3. William Stallings, “Operating System”, Prentice Hall of India, 4<sup>th</sup> Edition, 2003.
4. Pramod Chandra P. Bhatt – “An Introduction to Operating Systems, Concepts and Practice”, PHI, 2003.

**073250011**

**DATABASE MANAGEMENT SYSTEMS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION AND CONCEPTUAL MODELING (12)**

Introduction to File and Database systems- Database system structure – Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model – Relational Algebra and Calculus.

**UNIT II RELATIONAL MODEL (12)**

SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design – Functional dependences and Normalization for Relational Databases (up to BCNF).

**UNIT III DATA STORAGE AND QUERY PROCESSING (12)**

Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree – Query Processing.

**UNIT IV TRANSACTION MANAGEMENT (12)**

Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update - Shadow Paging.

**UNIT V CURRENT TRENDS (12)**

Object Oriented Databases – Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage – XML – Structure of XML- Data- XML Document- Schema- Querying and Transformation. – Data Mining and Data Warehousing.

**TOTAL: 60**

**REFERENCES:**

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- “Database System Concepts”, Fourth Edition, McGraw-Hill, 2002.
2. Ramez Elmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Third Edition, Pearson Education, 2003.
3. Raghu Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing Company, 2003.
4. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- “Database System Implementation”- Pearson Education- 2000.

**073250004**

**DESIGN AND ANALYSIS OF ALGORITHMS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**UNIT – I INTRODUCTION (9)**

Fundamentals of algorithmic problem solving – important problem types – Fundamentals of the analysis of algorithm efficiency – analysis frame work – Asymptotic NOTATIONS – Mathematical analysis for recursive and non-recursive algorithms.

**UNIT – II DIVIDE AND CONQUER METHOD AND GREEDY METHOD (9)**

Divide and conquer methodology – Merge Sort – Quick Sort – Binary search – Binary Tree Traversal – Multiplication of large integers- Strassen’s matrix multiplication Greedy method – Prim’s algorithm – Kruskal’s algorithm – Dijkstra’s Algorithm.

**UNIT – III DYNAMIC PROGRAMMING (9)**

Computing a binomial coefficient – Warshall’s and Floyd’s algorithm – Optimal binary search tree – Knapsack problem – Memory functions.

**UNIT – IV BACKTRACKING AND BRANCH AND BOUND (9)**

Backtracking – N-Queens problem – Hamiltonian circuit problem – subset sum problem- branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem.

**UNIT – V NP-HARD AND NP-COMPLETE PROBLEMS (9)**

P & NP, problems – NP- complete problems – Approximation algorithms for NP-hard problems traveling salesman problem – Knapsack problem.

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Anany Levitin “Introduction to the design and Analysis of Algorithms” Pearson Edition 2003.
2. Thomas H. Cormen, Charles E. Leiscerson, Ronald L. Rivest, “Introduction to algorithms” Prentice Hall 1990.

**073230028**

**MICROPROCESSORS AND INTERFACING**

**L T P C**  
**3 1 0 4**

**UNIT - I 8-BIT MICROPROCESSOR (9)**

8085 Architecture and Memory interfacing, interfacing I/O devices, Instruction set, Addressing Modes, Assembly language programming, counters and time delays, interrupts, timing diagram, Microprocessor applications.

**UNIT – II MICROCONTROLLER (9)**

Intel 8031/8051 Architecture, Special Function Registers (SFR), I/O pins, ports and circuits, Instruction set, Addressing Modes, Assembly Language Programming, Timer and Counter Programming, Serial Communication, Connection to RS 232, Interrupts Programming, External Memory interfacing, Introduction to 16 bit Microcontroller

**UNIT – III 80X86 PROCESSORS (9)**

8086 Architecture, Pin Configuration, 8086 Minimum and Maximum mode configurations, Addressing modes, Basic Instructions, 8086 Interrupts, Assembly levels programming. Introduction to 80186, 80286, 80386, 80486 and Pentium processors.

**UNIT – IV PERIPHERALS AND INTERFACING (9)**

Serial and parallel I/O (8251 and 8255), Programmable DMA Controller (8257), Programmable interrupt controller (8259), keyboard display controller (8279), ADC/DAC interfacing. Inter integrated circuits interfacing (I<sup>2</sup>C standard).

**UNIT – V UNIT MICROPROCESSOR BASED SYSTEMS DESIGN, DIGITAL INTERFACING (9)**

Interfacing to alpha numeric displays, interfacing to liquid crystal display (LCD 16 x 2 line), high power Devices and Optical motor shaft encoders, stepper motor interfacing, Analog interfacing and industrial control, microcomputer based smart scale, industrial process control system, Robotics and Embedded control, DSP and Digital Filters.

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Ramesh S. Gaonkar, Microprocessor Architecture Programming and Applications with 8085. Fourth edition, Penram International Publishing 2000.
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, The 8051 Microcontroller, and Embedded Systems, Prentice Hall 2000.
3. Douglas V.Hall, Microprocessor and Interfacing, Programming and Hardware. Tata McGraw Hill, Second Edition. 1999.
4. Kenneth J.Ayala., “The 8051 Microcontroller Architecture Programming and Applications”, Penram International Publishing (India). 1996.
5. Kenneth J.Ayala “The 8086 Microprocessor, Programming and Interfacing the PC”, Penram International Publishing. 1995.

**073230011**

**OPERATING SYSTEMS LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

1. Concurrency in Unix/ C  
- creating child processes using fork, exec
2. Implementation of Interprocess communication
3. Implementation of Process Scheduling Algorithms
4. Implementation of Process Synchronization
5. Design and Implementation of Deadlock algorithms
6. Implementation of Memory Management Algorithms
7. Implementation of Page replacement Algorithms
8. File system implementation
9. Directory implementation
10. Implementation of Disk Scheduling Algorithms

**073230017**

**DATABASE MANAGEMENT SYSTEMS  
LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. High-level language extension with Cursors.
4. High level language extension with Triggers
5. Procedures and Functions.
6. Embedded SQL.
7. Database design using E-R model and Normalization.
8. Design and implementation of Payroll Processing System.
9. Design and implementation of Banking System.
10. Design and implementation of Library Information System.

**073230025      MICROPROCESSORS AND INTERFACING LAB      L   T   P   C**  
**0   0   3   2**

1. Write an assembly language program to perform arithmetic operations on block of data using Hexadecimal numbers.
2. Write an assembly language program to perform arithmetic operations on block of data using BCD numbers.
3. Write an assembly language program to perform byte and string manipulation.
4. Write an assembly language program to interface Programmable Peripheral Interface.
5. Write an assembly language program to interface Programmable Timer.
6. Write an assembly language program to interface Programmable Communication Interface.
7. Write an assembly language program to interface Keyboard/Display Controller.
8. Write a program to Perform Power on Self Test.
9. Write a program for floppy disk trouble shooting.
10. Write a program for printer trouble shooting.

**TOTAL: 45**



**073250018**

**JAVA PROGRAMMING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**UNIT I JAVA BASICS-REVIEW**

**(9)**

Java Streaming – Components and events handling – Threading concepts – Networking-features – Byte code interpretation – Media Techniques.

**UNIT II JAVA DATA STRUCTURES**

**(9)**

Lists – Linear Structures – Ordered Structures – Sorting – Trees.

**UNIT III ADVANCED NETWORKING AND BEANS**

**(9)**

Client-Server computing – Sockets – Content and Protocols handlers – Developing distributed applications – RMI – Remote objects – Object serialization – Bean Concepts – Events in Bean Box – Bean customization and persistence.

**UNIT IV JAVA DATABASE PROGRAMMING**

**(9)**

Connecting to Databases – JDBC principles – Databases access – Interacting – Database search – Accessing Multimedia databases – Database support in Web applications.

**UNIT V RELATED JAVA TECHNIQUES**

**(9)**

3D graphics – JAR file format and creation – Internationalization – Swing Programming – Advanced Java Scripting Techniques.

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Ken Arnold, James Gosling and David Holmes, “The JAVA Programming Language”, 3<sup>rd</sup> edition, Tata Mc-Graw Hill, 2007
2. Elliotte Rusty Harold, “Java Network Programming”, O’Reilly publishers, 2000
3. Patrick Naughton, “Complete Reference: Java2”, 7<sup>th</sup> edition, Tata Mc-Graw Hill, 2003
4. H.M.Deitel, P.J.Deitel, “Java : how to program”, Fifth edition, Prentice Hall of India private limited.2005

**073230044**

**OBJECT ORIENTED ANALYSIS AND DESIGN**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION (9)**

Object model – Elements – Class and object – Nature of object/class – Relationship among objects – Relationship among classes – Quality classes and objects. Classification and Process - Classification – classical categorization –Conceptual clustering.

**UNIT II ANALYSIS AND DESIGN (9)**

Prototype theory – Analysis and design – Activities – Classical approaches – First principles – The Micro development process – The Macro Development process. UML Notations – UML model – Introduction Use case – Usage –Class diagrams – Perspectives.

**UNIT III UML MODELS (9)**

Perspectives – Associations – Attributes – Operations – CRC cards – Usage – Interaction diagrams – Sequence diagrams – Collaboration diagrams – Package diagrams – Concurrent state diagram – Activity diagram – Decomposing and activity – Domain model – Specification model – System design – Detailed design – Coding

**UNIT IV OBJECT ORIENTED TECHNIQUES (9)**

Object Oriented model traditional techniques - Current techniques - Approach to identify attribute – Service – Method. Behaviour Specifications – Static behaviour specification techniques Control – Documenting control.

**UNIT V STATIC AND DYNAMIC BEHAVIOR (9)**

Documenting static behaviour - Dynamic behaviour identification - Specification techniques - Documenting - Event specifications - Identifying relationships.

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Martin Fowler, Kendall Scott, “UML Distilled - Applying the standard object modeling language”, Addison Wesley, 1997.
2. Richard C Lee, William M Tepfenhart, “UML and C++ - A practical guide to object oriented development”, PH, 1997.
3. Grady Booch, “Object Oriented Analysis and Design with applications” II Edition Addison Wesley, 1994.
4. James Martin & James J. Odell, “Object Oriented Methods - A foundation”, Prentice Hall, 1997.

**073250019**

**COMPUTER NETWORKS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I DATA COMMUNICATIONS (12)**

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies – Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences.

**UNIT II DATA LINK LAYER (12)**

Error – detection and correction – Parity – LRC – CRC – Hamming code – low Control and Error control - stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11 – FDDI - SONET – Bridges.

**UNIT III NETWORK LAYER (12)**

Internetworks – Packet Switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

**UNIT IV TRANSPORT LAYER (12)**

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

**UNIT V APPLICATION LAYER (12)**

Domain Name Space (DNS) – SMTP – FTP – HTTP - WWW – Security – Cryptography.

**TOTAL: 60**

**REFERENCES:**

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 2004.
2. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, 2003.
3. Andrew S. Tanenbaum, “Computer Networks”, PHI, Fourth Edition, 2003.
4. William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education, 2000.

**073250021**

**JAVA PROGRAMMING LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

1. Implementation of Interfaces and packages.
2. Implementation of Multithreading and Exception Handling concepts.
3. Implementation of Applets.
4. Front End Development using swing and AWT.
5. Message transfer using TCP/IP Protocol.
6. Developing a simple Application using Servlets.
7. Developing a simple Application using JSP.
8. Developing a simple Application using JDBC.

**TOTAL: 45**

**073230045**

**CASE TOOLS LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

1. Familiarization of features of any one of the standard UML case tool.
2. Capturing key functional requirements as Use cases and class diagram for online ticket / hotel reservation systems, student information system, sales and marketing system, banking system and inventory tracking system.
3. Interacting diagrams, state chart diagrams etc for systems in 2.
4. Implementation using any one of object oriented languages like Java, C++ for systems in 2.
5. Component diagrams, deployment diagrams for system in 2.
6. Unit test case, integration test case for systems in 2.

**073250020**

**COMPUTER NETWORKS LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

(All the programs are to be written using C)

1. Simulation of ARP / RARP.
2. Write a program that takes a binary file as input and performs bit stuffing and CRC Computation.
3. Develop an application for transferring files over RS232.
4. Simulation of Sliding-Window protocol.
5. Simulation of BGP / OSPF routing protocol.
6. Develop a Client – Server application for chat.
7. Develop a Client that contacts a given DNS Server to resolve a given host name.
8. Write a Client to download a file from a HTTP Server.
- 9 & 10 Study of Network Simulators like NS2/Glomosim / OPNET

**TOTAL: 45**

## SEMESTER V

073250027

### WEB TECHNOLOGY

L	T	P	C
4	0	0	4

#### UNIT I INTRODUCTION (12)

Internet Principles – Basic Web Concepts – Client/Server model – Retrieving data from Internet – HTML and Scripting Languages – Standard Generalized Mark-up Language –Next Generation Internet – Protocols and applications.

#### UNIT II COMMON GATEWAY INTERFACE PROGRAMMING (12)

HTML forms – CGI Concepts – HTML tags Emulation – Server-Browser communication – E-mail generation – CGI Client side Applets – CGI Server Side Applets – Authorization and security.

#### UNIT III SOCKET PROGRAMMING (12)

Streaming – Networking principles – sockets – protocol handlers – content handlers – multicasting – Remote Method Invocation – activation – Serialization - Marshal Streams.

#### UNIT IV SERVER SIDE PROGRAMMING (12)

Dynamic web content – cascading style sheets – DHTML – XML - Server side includes - communication – Active and Java Server Pages - Firewalls – proxy servers.

#### UNIT V ONLINE APPLICATIONS (12)

Simple applications – On-line databases – monitoring user events – plug-ins – database connectivity – Internet Information Systems - EDI application in business – Internet commerce –Customization of Internet commerce

**TOTAL: 60**

#### REFERENCES:

1. Rashim Mogha, Preetham.V.V., “ Java Web Services Programming”, Wiley Dreamtech, New Delhi, 2002.
2. Deitel ,“ XML How to Program”, first edition, Pearson Education, USA, 2002.
3. Jason Hunter, William Crawford, “Java Servlet Programming”, O’ Reilly Publications, USA, 1998.
4. Bhanu Pradhap, “ Understanding Active Server Pages “, Cyber Tech Publications ,New Delhi, 2001.
5. James Conard,Patrick Dengler,Brain Franics Et Al, “ Introducing .NET “, Shroff Publishers, New Delhi, 2001.

073650009

**SOFTWARE TESTING**

**L T P C**  
**3 1 0 4**

**UNIT I INTRODUCTION (9)**

Testing as an Engineering Activity – Testing as a Process – testing axioms - Basic Definitions – Software Testing Principles – The Tester’s Role in a Software Development Organization – Origins of Defects – cost of defects - Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository – Defect Prevention Strategies

**UNIT II TEST CASE DESIGN (9)**

Test Case Design Strategies – Using Black Box Approach to Test Case Design - Random Testing – Requirements based testing – Boundary Value Analysis – Decision tables - Equivalence Class Partitioning - State-based testing – Cause-effect graphing – Error guessing - Compatibility testing – User documentation testing – Domain testing. Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing - Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White-box Based Test Design – code complexity testing – Evaluating Test Adequacy Criteria.

**UNIT III LEVELS OF TESTING (9)**

The Need for Levels of Testing – Unit Test – Unit Test Planning –Designing the Unit Tests - The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination. System Testing – Acceptance testing – Performance testing - Regression Testing – Internationalization testing – Ad-hoc testing - Alpha , Beta Tests – testing OO systems – Usability and Accessibility testing – Configuration testing - Compatibility testing – Testing the documentation – Website testing

**UNIT IV TEST MANAGEMENT (9)**

People and organizational issues in testing – organization structures for testing teams – testing services - Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process - Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

**UNIT V TEST AUTOMATION (9)**

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation - Test metrics and measurements –project, progress and productivity metrics

**L: 45 T: 15 Total : 60**

**REFERENCES:**

1. Srinivasan Desikan and Gopalaswamy Ramesh, “ Software Testing – Principles and Practices”, Pearson education, 2006.
2. Ilene Burnstein, “Practical Software Testing”, Springer International Edition, 2003.
3. Ron Patton, “ Software Testing”, Second Edition, Sams Publishing, Pearson education, 2007
4. Renu Rajani, Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004.
5. Aditya P. Mathur, “Foundations of Software Testing – Fundamental algorithms and techniques”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008

**073250022**

**MULTIMEDIA SYSTEMS**

**L T P C**  
**3 1 0 4**

**UNIT I OUTPUT PRIMITIVES (9)**

Introduction - Line - Curve and Ellipse Drawing Algorithms – Attributes – Two-Dimensional Geometric Transformations – Two-Dimensional Clipping and Viewing.

**UNIT II THREE-DIMENSIONAL CONCEPTS (9)**

Three-Dimensional Object Representations – Three-Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing – Color models – Animation.

**UNIT III MULTIMEDIA SYSTEMS DESIGN (9)**

An Introduction – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data interface standards – Multimedia Databases.

**UNIT IV MULTIMEDIA FILE HANDLING (9)**

Compression & Decompression – Data & File Format standards – Multimedia I/O technologies - Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval Technologies.

**UNIT V HYPERMEDIA (9)**

Multimedia Authoring & User Interface – Hypermedia messaging - Mobile Messaging – Hypermedia message component – Creating Hypermedia message – Integrated multimedia message standards – Integrated Document management – Distributed Multimedia Systems.

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Donald Hearn and M.Pauline Baker, “Computer Graphics C Version”, Pearson Education, 2003.(UNIT I : Chapters 1 to 6; UNIT 2: Chapter 9 – 12, 15, 16)
2. Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems and Design”, PHI, 2003. (UNIT 3 to 5)
3. Judith Jeffcoate, “Multimedia in practice technology and Applications”, PHI, 1998.
4. Foley, Vandam, Feiner, Huges, “Computer Graphics: Principles & Practice”, Pearson Education, second edition 2003.

**075580004**

**WEB TECHNOLOGY LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

Creating applications using web development tools

1. HTML
2. HTML & VB Script
3. XML
4. XML , CSS
5. XML , XSL
6. XML , DTD
7. Active Server Pages
8. ASP with scripts
9. Java Server Pages
10. .NET platform

**075580005**

**SOFTWARE TESTING LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

1. Practice structural analysis and design techniques using case tools.
2. Simulate Software architectural components.
3. Practice user interface design for real time applications.
4. Practice object oriented analysis and design using case tools.
5. Implement real time applications using design patterns.
6. Case study on different software testing tools.
7. Simulate verification and validation environment
8. Implement the structured system Testing techniques.
9. Simulate a software testing suite which performs the functionalities of different phase testing of software development life cycle

**075580006**

**MULTIMEDIA SYSTEMS LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

1. Image Editing Using Adobe Photoshop and ImageReady
2. Animation using Macromedia Flash
3. Video Editing using I-Movie
4. Video synchronization with audio using I-Movie
5. Video and audio editing with synchronization using Final Cut



**075230028          DISTRIBUTED COMPONENT ARCHITECTURE          L   T   P   C**  
**3   1   0   4**

**UNIT I          INTRODUCTION          (9)**

Review of Object Oriented Technology – RPC Concepts - ActiveX and OLE concepts - Component concepts - Basics of Distributed Objects

**UNIT II          CORBA          (9)**

CORBA Overview – Object Management Group – Object Management Architecture – CORBA Architecture – ORB Structure – OMG IDL – ORB and Object Interfaces – Object Adapter - Basic Object Adapter – Portable Object Adapter – Language Mappings – Dynamic Invocation and Dynamic Skeleton Interface – BOA Vs POA

**UNIT III          COM/DCOM          (9)**

Fundamental Programming Architecture: From OLE to DCOM – COM Background – COM Interfaces – Types of Components – COM library. IUnknown and IClassFactory – Type Libraries – Threading models and Apartments – DLL Surrogates and Executable Components - Marshalling – Distributed COM

**UNIT IV          DISTRIBUTED SYSTEM SERVICES          (9)**

Naming Services: Overview - CORBA Naming. Directory and trading services: CORBA Trading Service.

Activation Services : CORBA Activation Framework. Messaging Services : Messaging Overview – CORBA Messaging.

**UNIT V          ENTERPRISE SYSTEMS ARCHITECTURE          (9)**

Enterprise architectural overview – enterprise concepts – Introduction to Java Enterprise system architecture with J2EE.

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Andreas Vogel, Vasudevan B., Benjamin M. and Ted Villalba, “C++ Programming with CORBA”, John Wiley & Sons, New York, 1999.
2. Guy Eddon and Henry Eddon, "Inside Distributed COM", Microsoft Press, USA, 2001.
3. Paul J Perrone , Venkata S.R. Krishna, Chayanti R., " Building Java Enterprise Systems with J2EE" ,Tech media, USA 2000.
4. Dirk Slama, Jason Garbis and Perry Russel,” Enterprise CORBA”, Prentice Hall PTR, New Jersey, 1999.
5. Roger Sessions, "COM and DCOM", John Wiley, Singapore 1998

**075250015**

**OPEN SOURCE COMPUTING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION (12)**

Introduction of Open Sources – Need of Open Sources – Advantages and applications of Open sources – Commercial aspects of Open source movement

**UNIT II OPEN SOURCE OS: LINUX (12)**

Introduction – General Overview – Kernel Mode and user mode – Process – Advanced concepts – Scheduling – Cloning – Signals

**UNIT III SOLARIS (12)**

Fundamentals - The Solaris 8 Operating Environment Components - Accessing Directories and Files - Using File Security - Creating Archive Files - Connecting Remotely - Managing System Processes - Using the Korn Shell and the CDE

**UNIT IV OPEN SOURCE DATABASE: My SQL (12)**

Introduction – SQL programs – Selection – Strings – Date and Time – Working with metadata – Sequences – MySQL and web

**UNIT V OPEN SOURCE PROGRAMMING LANGUAGES: PHP (12)**

Introduction – Programming in web environment – Variables – Constants – Datatypes – Operators – Statements – Functions – Arrays – OOP – String manipulation – File handling and data storage – PHP and SQL database – PHP connectivity – Debugging and error handling – Security – Templates – Apache web server – Working with Web Server – Configuring and using apache web services – Eclipse IDE platform

**TOTAL: 60**

**REFERENCES:**

1. Remy Card, Eric Dumas, Frank Mevel, “The Linux Kernel Book”, second edition, John Wiley Publications, New York, 2003.
2. Darry, Gove, “ Solaris Application Programming”, first edition, Prentice Hall, New Delhi, 2007.
3. Steve Suehring, “MySQL Bible”, first edition, John Wiley & Sons, New York, 2002.
4. Rasmus Lerdorf, Levtin Tatroe, “Programming PHP”, second edition, O’Relly Publications, USA, 2002.
5. Peter Wainwright, “Professional Apache”, third edition, Wrox Press, USA, 2002.



<b>075580013</b>	<b>DISTRIBUTED COMPONENT ARCHITECTURE LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

1. Implementing Remote Procedure Call
2. Implementing Remote Method Invocation
3. Implementing Message Passing Interface using sockets
4. Implementing COM concepts in VB
5. Implementing DCOM concepts in VB

<b>075580014</b>	<b>SOFTWARE LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

1. Study of case tools such as rational rose or equivalent tools
2. **REQUIREMENTS**  
Implementation of requirements engineering activities such as elicitation, validation, management using case tools
3. **ANALYSIS AND DESIGN**  
Implementation of analysis and design using case tools.
4. Study and usage of software project management tools such cost estimates and scheduling
5. Documentation generators - Study and practice of Documentation generators.
6. Data modeling using automated tools.
7. Practice reverse engineering and re engineering using tools.
8. Exposure towards test plan generators, test case generators, test coverage and software metrics.
9. Meta modeling and software life cycle management

## SEMESTER VIII

**073250028**

**EMBEDDED SYSTEMS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION TO EMBEDDED SYSTEMS (9)**

Definition and Classification – Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits

**UNIT II DEVICES AND BUSES FOR DEVICES NETWORK (9)**

I/O Devices - Device I/O Types and Examples – Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices - ‘12C’, ‘USB’, ‘CAN’ and advanced I/O Serial high speed buses- and advanced buses.

**UNIT III PROGRAMMING CONCEPTS (9)**

Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - Multiple function calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers –Cross compiler – Optimization of memory codes.

**UNIT IV REAL TIME OPERATING SYSTEMS – PART - 1 (9)**

Definitions Of Process, Tasks And Threads – Clear Cut Distinction Between Functions – Isrs And Tasks By Their Characteristics – Operating System Services- Device Management – File System Organisation And Implementation – I/O Subsystems – Interrupt Routines Handling In RTOS, Real Time Operating Systems, Inter Process Communication And Synchronisation — Remote Procedure Calls.

**UNIT V REAL TIME OPERATING SYSTEMS – PART - 2 (9)**

Study of Micro C/OS-II or Vx Works or Any other popular RTOS – RTOS System Level Functions — Case Studies of Programming with RTOS – Understanding Case Definition – Multiple Tasks and their functions – Creating a list of tasks – Functions and IPCs – Exemplary Coding Steps.

**L: 45 T : 15 Total 60**

**REFERENCES:**

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint Oct. 2003
2. Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes,
3. David E.Simon, An Embedded Software Primer, Pearson Education Asia, New Delhi, 2004.
4. Wayne Wolf, Computers as Components; Principles of Embedded Computing System Design – Harcourt India, Morgan Kaufman Publishers, New Delhi, 2006

**075230038**

**SOFTWARE METRICS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I MEASUREMENT THEORY**

**(12)**

Fundamentals of measurement – Measurements in Software Engineering – Scope of Software metrics – Measurement theory – Goal based framework – Software measurement validation.

**UNIT II DATA COLLECTION AND ANALYSIS**

**(12)**

Empirical investigation – Planning experiments – Software metrics data collection – Analysis methods – Statistical methods.

**UNIT III PRODUCT METRICS**

**(12)**

Measurement of internal product attributes – Size and structure – External product attributes – Measurement of quality.

**UNIT IV QUALITY METRICS**

**(12)**

Software quality metrics – Product quality – Process quality – Metrics for software maintenance – Case studies of Metrics Program – Motorola – HP and IBM.

**UNIT V MANAGEMENT METRICS**

**(12)**

Quality management models – Rayleigh Model – Problem Tracking report (PTR) model – Reliability growth model – Model evaluation – Orthogonal defect classification.

**TOTAL: 60**

**REFERENCES:**

1. Normal. E – Fentor Shari Lawrence Pfllegar, “Software Metrics”, International Thomson Computer Press, 2003
2. Fentor Mrman E., “Software Metrics: A Regimes Approach”, Chapman & Hall, London, 2001.

**075230039**

**ADVANCED JAVA PROGRAMMING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**UNIT I      JAVA BASICS REVIEW      (9)**

Java streaming - Networking - Event handling - Multithreading - Byte code Interpretation - Customizing application - Data Structures - Collection classes.

**UNIT II      DISTRIBUTED COMPUTING      (9)**

Custom sockets - Remote Method Invocation - Activation - Object serialization -Distributed garbage collection - RMI - IIOP - Interface definition language - CORBA - JINI overview.

**UNIT III      JAVA BEANS AND SWING      (9)**

Bean concepts - Events in bean box - Bean customization - Persistence - Application - deployment using swing - Advanced swing techniques - JAR file handling.

**UNIT IV      JAVA ENTERPRISE APPLICATIONS      (9)**

JNI - Servlets - Java Server Pages - JDBC - Session beans - Entity beans - Programming and deploying enterprise Java Beans - Java transactions

**UNIT V      RELATED JAVA TECHNIQUES      (9)**

Java Media Frame work - 3D graphics - Internationalization - Case study - Deploying n-tier application, E- commerce applications

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Deitel & Deitel , "Java How to program" , Prentice Hall , 4 th Edition, 2000.
2. Gary Cornell and Cay S. Horstmann, "Core Java Vol 1 and Vol 2", Sun Microsystems Press, 1999.
3. Stephen Asbury, Scott R. Weiner, Wiley, "Developing Java Enterprise Applications", 1998.

**075250008**

**EMBEDDED SYSTEMS LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

1. Study of 8051 Microcontroller kit and simulator
2. Arithmetic operations , Addition, Subtraction, Multiplication and Division
3. Interrupt programming
4. Design of moving display
5. Parallel interfacing , testing of I/O ports
6. Keyboard/display interface
7. Traffic light controller interface
8. ADC/DAC interface
9. Serial interfacing , Kit to PC communication
10. Interfacing a LCD display

**075230040**

**ADVANCED JAVA PROGRAMMING LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

1. Multithreaded Messaging Application using Java Sockets
2. Multicast Communication using Java Multicast class
3. Distributed Programming with Java RMI
4. Database Programming using JDBC and Java Swing
5. Web Programming using JSP and EJB

**SEMESTER IX**

<b>075250023</b>	<b>MANAGEMENT INFORMATION SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION (9)**

Overview – Structure of MIS – Survey of Information System Technology – Hardware, Software and Communication or Information – Storage and Retrieval of Data – Transactions Processing, Office Automation and Information Processing Control Function.

**UNIT II CONCEPTIONAL FOUNDATIONS (9)**

Design making Process – Concept of Information – Human as Information Processors – System Concepts – Concepts of Planning and Control – Organizational Structure and Management Concepts.

**UNIT III INFORMATION BASED SUPPORT SYSTEMS (9)**

Support System for Planning, Control and Decision making – Support System for Management for Knowledge work – Decision Support Systems.

**UNIT IV INFORMATION SYSTEM REQUIREMENTS (9)**

Developing a long range Information System – Plan Strategies for the determination of Information requirement – Database requirement – User interface requirements.

**UNIT V DEVELOPMENT, IMPLEMENTATION AND MANAGEMENT OF INFORMATION SYSTEM RESOURCES (9)**

Developing and Implementing Application Systems – Quality Assurance and Evaluation of Information Systems – Organization and Management of the Information Resources – Further Development and their Organizational and Social Implications.

**TOTAL: 45**

**REFERENCES:**

1. Gordan B Davis and Megrette H Olson, "Management Information Systems", McGraw Hill, 1997
2. Murdick and Ross, "Information System for Modern Management", Prentice Hall of India, 1997.
3. David Kroenke, "Management Information Systems", McGraw Hill International Editions, 1989.

**075580018**

**ENTERPRISE RESOURCE PLANNING**

**L T P C**  
**3 0 0 3**

**UNIT I INTRODUCTION (9)**

ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM

**UNIT II ERP IMPLEMENTATION (9)**

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring

**UNIT III THE BUSINESS MODULES (9)**

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution

**UNIT IV THE ERP MARKET (9)**

ERP Market Place, SAP AG, Peoplesoft, Baan, JD Edwards, Oracle, QAD, SSA

**UNIT V ERP – PRESENT AND FUTURE (9)**

Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions

**TOTAL: 45**

**REFERENCES:**

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000
2. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology, USA, 2001.
3. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI, New Delhi, 2003

**075580019**

**SOFTWARE REUSE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION (9)**

Organizing Reuse – Introduction – Motivation for Reuse – Reuse driven organizations – Managing a reuse project – the characteristics of reuse of projects – Roles in reuse projects – Adopting a project to reuse – Reuse tools.

**UNIT II REUSE METRICS (9)**

Managing a repository – The REBOOT component model – Classification – Configuration management of the repository – Managing the repository – Computer supported cooperative working – Process metrics for reuse – Product metrics – Cost estimation – Forming a reuse strategy – Assessing reuse maturity.

**UNIT III REUSABLE COMPONENTS (9)**

Practicing reuse – Generic reuse development process – Develop for reuse – Develop with reuse – Testing reusable components – Object oriented components – Technique and life cycles – Object oriented development for reuse – Architectural design for reuse – Detailed design for reuse – Implementation for reuse – Verification, test and validation.

**UNIT IV REUSE PHASES (9)**

Development with reuse – with reuse specific activities – Common reuse processes – Phases of development with reuse – Impact of reuse on development cycle.

**UNIT V CLEAN ROOM SOFTWARE ENGINEERING (9)**

Re-engineering for reuse – Methodology – Retrieving objects in non-object oriented code – Measurements – Tools support for reengineering - Over view of clean room software engineering – Phases in clean room method – Box structures algorithms – Adapting the box structures.

**L: 45 T: 15 TOTAL: 60**

**REFERENCES:**

1. Even-Andre'Karisson, "Software Reuse – A Holistic Approach, John Wiley and Sons, 1996.
2. Karma McClure, "Software Reuse Techniques – Additional reuse to the systems development", Prentice Hall, 1997.
3. Irar Jacobson, Martin Griss and Patrick Johnson, "Software Reuse; Architecture, Process and Organization for Business Success", Aem PRSS / Addison Wesley, New York, 1992.

**075580020**

**ENTERPRISE RESOURCE PLANNING LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

Mini Projects to be given to students covering the following modules

1. Human Resources
2. Material Management
3. Production Planning
4. Quality Control
5. Logistics
6. Maintenance
7. Sales & Distribution
8. Finance

**075580021**

**SOFTWARE REUSE LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

1. Preparation of Project Management Plan.
2. Using any of the CASE tools, Practice requirement analysis and specification for different firms.
3. Case study of cost estimation models.
4. Practice object oriented design principles for implementation.
5. Practice function oriented design.
6. Practice creating software documentation for all the phases of software development life cycle with respect to any real time application.
7. Simulate a tool for path testing principles.
8. Simulate a tool for testing based on control structures.
9. Simulate a tool that reflects black box testing concepts.

## ELECTIVES

### SEMESTER IV

<b>073580006</b>	<b>SOFTWARE PROJECT MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION 12**

Introduction – Product Life – Project life cycle models - water fall model – Prototyping model – RAD model – Spiral Model – Process Models – Matrics.

**UNIT II CONFIGURATION MANAGEMENT 12**

Software Configuration Management – Definitions and terminology – processes and activities – Configuration audit – Matrics – Software Quality assurance – definitions – quality control and assurance – SQA Tools – Organisation of Structures - Risk Management – Risk Identification, quantification Monitoring – Mitigation.

**UNIT III PROJECT PLANNING 12**

Project initiation – Project Planning and tracking – what, cost, when and how – organisational processes – assigning resources – project tracking – project closure – when and how.

**UNIT IV SOFTWARE REQUIREMENTS 12**

Software requirements gathering – steps to be followed – skills sets required – challenges – matrics – Estimation 3 phases of estimation – formal models for size estimation – translating size estimate to effort schedule estimate, matrics – Design and Development phases – reusability, Technology choices, Standards, Portability user interface – testability – diagonosability etc.

**UNIT V TESTING 12**

Project Management in testing phase – in the maintenance phase – Impact on internet on project Management.

**TOTAL: 60**

#### REFERENCES:

1. Gopaldaswamy Ramesh, “Managing Globle Software Projects” Tata McGraw Hill Publishing Company Ltd, New Delhi, 2002
2. Bob Hughes and Mike Cotterell “Software Project Management”2<sup>nd</sup> edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002.
3. Pressman, Roger, “Software Engineering ", A Practitioner's approach, 7<sup>th</sup> edition, Tata Mc-Graw Hill, 2006



**073250023**

**CLIENT SERVER COMPUTING**

**L T P C**  
**4 0 0 4**

**UNIT I INTRODUCTION (12)**

Client Server Computing era, Real Client/Server, Fat Servers or fat clients, 2 tier Vs 3 tier, Intergalactic client server, client server for different models, building blocks

**UNIT II CLIENT/SERVER OPERATING SYSTEMS (12)**

Anatomy of Server programs, Server needs from OS, Server scalability, Client anatomy, Client needs from OS, Client OS trends , MAC OS, Linux OS, Win OS, Server OS trends , NetWare, Win 2000 Server, OS/2 warp server

**UNIT III CLIENT SERVER MIDDLEWARE (12)**

NOS Middleware, global directory services, X.500, LDAP, distributed time services, distributed security services, RPC messaging and peer to peer , Sockets, NetWare, NetBIOS, remote procedure call, messaging and queuing, MOM Vs RPC, Evolution of the NOS, DCE , The enterprise NOS, the internet as NOS

**UNIT IV CLIENT SERVER TRANSACTION PROCESSING (12)**

ACID Properties, Transaction Models, TP Monitor, TP Monitor and OS, TP Monitor and Transaction Management, TP Monitor Client/ Server Interaction types, Transactional RPC, Queues, TP Lite or TP Heavy, TP Lite versus TP Heavy – Managing Heterogeneous networks, Process Management, client/server invocations, Performance

**UNIT V CLIENT SERVER AND INTERNET (12)**

Client server and internet, Web client server, 3 tier client server web style, CGI , the server side of web, CGI and State, SQL database servers, Middleware and federated databases, data warehouses, EIS/DSS to data mining, GroupWare Server , what is GroupWare, components of GroupWare

**TOTAL: 60**

**REFERENCES:**

1. Robert Orfali, Dan Harkey & Jeri Edwards, “Essential Client/Server Survival Guide”, second edition, John Wiley & Sons, Singapore, 2003.
2. James E. Goldman, Phillip T. Rawles, Julie R. Mariga, “Client/Server Information Systems, A Business Oriented Approach”, John Wiley & Sons, Singapore, 2000.
3. Eric J Johnson, “A complete guide to Client / Server Computing”, first edition, Prentice Hall, New Delhi, 2001.
4. Smith & Guengerich, “Client /Server Computing”, Prentice Hall, New Delhi, 2002



## SEMESTER V

**073580010**

### SOFTWARE AGENTS

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION (12)**

Agent definition – agent programming paradigms – Agents Vs objects – aglets – mobile agents – agent frame works – agent reasoning

**UNIT II JAVA AGENTS (12)**

Processes – threads – daemons – components – Java Beans – ActiveX – Sockets, RPCs – distributed computing – aglets programming – Jini architecture – actors and agents – typed and proactive messages

**UNIT III MULTIAGENT SYSTEMS (12)**

Interaction between agents – reactive agents – cognitive agents – interaction protocols – agent coordination – agent negotiation – agent cooperation – agent organization – self –interested agents in electronic commerce applications

**UNIT IV INTELLIGENT SOFTWARE AGENTS (12)**

Interface Agents – Agent Communication Languages – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile Agent Applications

**UNIT V AGENTS & SECURITY (12)**

Agent Security Issues – Mobile Agents Security – Protecting Agents Malicious Hosts – Un trusted Agents – Black box Security – Authentication for Agents – Security issues for Aglets.

**TOTAL: 60**

**REFERENCES:**

1. Joseph P. Bigus, Jennifer Bigus, “ Constructing intelligent agents with Java: A Programmers Guide to Smarter Applications”, John Wiley & Sons Inc , 1<sup>st</sup> edition, New Delhi, 2000
2. Bradshaw Jeffrey M, “Software Agents”, MIT Press, 1<sup>st</sup> edition, New Delhi, 2000
3. Russel S. and Norvig P, “Artificial Intelligence: A Modern Approach”, Prentice Hall, 2<sup>nd</sup> edition, New Delhi, 2002
4. Richard Murch, Tony Johnson, “Intelligent Software Agents”, Prentice Hall, 1<sup>st</sup> edition, New Delhi, 2000.

**073580011**

**REAL TIME SYSTEMS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION (12)**

Introduction – Characterizing real time system and task performance measures real time systems – Estimating program run time – Task assignment and schedule classical Uni. – processor scheduling algorithm, Uni-processor scheduling of IRTS task, Task assignment, mode changes.

**UNIT II TOOLS AND LANGUAGES (12)**

Programming Languages and tools – Desired Language characteristics, Data type control structures, facilitating hierarchical decomposition packages, Run time error handling, Overloading and generics, Multitasking, Low level programming, Task Scheduling, Time specification Programming, Environmental, Run time supports.

**UNIT III REAL TIME DATABASES (12)**

Real Time databases – basic definition, Real time Vs General purpose Database, main memory database, Transaction priorities, Transaction aborts concurrency control issues, Disk scheduling algorithms, Improving predictability, maintaining serialization consistency, Databases for hand real time systems.

**UNIT IV REAL TIME COMMUNICATION (12)**

Real time communication – Introduction, Network topologies, Protocols, Fault tolerance – introduction, Fault Types, Fault detection, Fault and error containment, Redundancy, Data diversity, Reversal checks, Integrated failure handing.

**UNIT V EVALUATION TECHNIQUES (12)**

Reliability evaluation techniques – Obtaining parameter values, Reliability models for hardware redundancy, Software error models, tasking time into account. Clock synchronization : Clocks, A non-fault tolerant synchronization algorithms, impact of faults, fault tolerance synchronization hardware, synchronization in software.

**TOTAL : 60**

**REFERENCES:**

1. C.M.Krishna and Kang G.Shin, “Real Time Systems”, McGraw Hill International Edition, 1997.
2. Stuart Bennett, “ Real Time Computer Control, An Introduction”, Prentice Hall Internation Edition, 1988.
3. Peter D.Lawrence, “Real Time Micro-Computer System Design, An Introduction”, Konrad Manch, McGraw Hill, 1988.
4. S.T.Allworth and R.N.Zobel, “Introduction to Real Time Software Design”, Macmillan Education, Second edition, 1987.

**073580012**

**COMPONENT BASED DEVELOPMENT**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION (12)**

What is CBD? – Industrialization of software development, CBD drivers and benefits, technology evolution, components and network computing.

**UNIT II FUNDAMENTALS (12)**

Basic concepts of CBD Scenarios for CBD, evolution or revolution?, build, find and use components and objects.

**UNIT III MODELS (12)**

Basic concepts of object models Components and interfaces, working with interfaces, component and interface modeling, specification models, domain modeling, describing classes, patterns and frameworks.

**UNIT IV USING CBD (12)**

Categorizing & deploying components, CORBA, DCOM.

**UNIT V FRAMEWORKS (12)**

Class libraries, encapsulated components, software frameworks, pre-built applications.

**TOTAL: 60**

**REFERENCES:**

1. Clemens Szyperski, Component Software – Beyond object – oriented programming, Addison – Wesley, 1998.
2. Kuth Short, Component Based Development and Object Modeling, Sterling Software, 1997.
3. Robert Ortali and Dam Harkly, Client / Server Programming with Java and Corba, John Wiley & Sons, 1998.

**UNIT I INTRODUCTION (12)**

Introduction – A taxonomy of software design – Goal Directed design – User’s Goal – The essence of user interface design. The three models – manifest model – visual interface design – visual processing – visual patterns – restricting the vocabulary – canonical vocabulary and domain knowledge. Form – Idioms and affordances – history of rectangles on the screen – windows with a small w – lord of the files – storage and retrieval systems – choosing platforms.

**UNIT II USER INTERFACE (12)**

Behavior of Presentation – orchestration and flow – Techniques for inducing and maintaining flow – characteristic of good user interfaces – postures and types – states of windows – different types of tasks – idiocy – The weapon of Interface Design – task coherence.

**UNIT III INTERACTIONS (12)**

The Interaction – pointing and clicking – mouse operations – Selection – object verb – concrete and discrete data – insertion and replacement – mutual exclusion – additive and group selection – visual indications. Direct manipulation manipulating Gizmos – repositioning – resizing and reshaping – arrowing – direct – manipulation visual feedback – drag and drop.

**UNIT IV TOOLS (12)**

Cast effects – menus meaning – menus and dialog boxes – dialog box etiquette – toolbars – Gizmos – Types of Gizmos – Entry and display Gizmos – New Gizmos.

**UNIT V SPECIAL FUNCTIONS AND COMMANDS (12)**

Protecting user – eliminating dialog and error boxes – managing exceptions – alerts – audible feedback – undo – troubles – redo – special undo functions. Command vectors – installation – configuration – personalization.

**TOTAL: 60**

**REFERENCES:**

1. Alan Cooper, “The Essentials of User Interface Design”, IDG Books, 1995.
2. Ben Schneider Man, “Designing the User Interface”, Addition Wesley, 2000.
3. Jacob Nielson, “Usability Engineering”, Academic Press, 1993.
4. Alan Dix Janet Finlang, Gregory Aboard and Russel Seale, Human, “Computer Interaction”, Prentice Hall, 1993.

**075580011**

**NETWORK SECURITY & CRYPTOGRAPHY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I CONVENTIONAL AND MODERN ENCRYPTION (12)**

Services – Attacks – Steganography - Classical Encryption Techniques – DES – Differential and Linear Cryptanalysis – Modes of operation – Encryption Algorithms – Triple DES – Blowfish – CAST128

**UNIT II PUBLIC KEY ENCRYPTION (12)**

Uniqueness – Number Theory concepts – Primality – Modular Arithmetic – Fermat & Euler Theorem – Euclid Algorithm – RSA Algorithm – Elliptic Curve Cryptography – Diffie Hellman Key Exchange

**UNIT III AUTHENTICATION AND SECURITY PRACTICE (12)**

Digests – Requirements – MAC – Hash function – Security of Hash and MAC – Birthday Attack – MD5 – SHA – RIPEMD – Digital Signature Standard - Authentication applications – Kerberos – Kerberos Encryption Techniques – PGP– IP Security Architecture– Web security – SSL – TLS – SET

**UNIT IV PUBLIC- KEY INFRASTRUCTURE (12)**

Legislation - Regulation and Guidelines, Non-repudiation - Certification Policies and Practices- Public-Key Infrastructure Assessment and Accreditation

**UNIT V SYSTEM SECURITY & STANDARDS (12)**

Intruders and Intrusion – Viruses and Worms – OS Security – Firewalls – Design Principles – Packet Filtering – Application gateways – Trusted systems – Counter Measures. Blueprint for Security – Information Security Policy – Standards and Practices – ISO 17799/BS 7799 – NIST Models – VISA International Security Model – Design of Security Architecture – Planning for Continuity.

**TOTAL: 60**

**REFERENCES:**

1. William Stallings, “Cryptography & Network Security”, Pearson Education, 5<sup>th</sup> edition. New Delhi 2005.
2. Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security, Private Communication in a Public World”, Prentice Hall of India, 1<sup>st</sup> edition, New Delhi, 2002.
3. Bruce Schneier, Niels Ferguson, “Practical Cryptography”, Wiley Dreamtech India Pvt Ltd, 1<sup>st</sup> edition, New Delhi, 2003.

**073250033**

**SERVICE ORIENTED ARCHITECTURE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I THE TECHNOLOGY OF ENTERPRISE SOA (12)**

The goal of loose coupling-Web services overview-Introducing Service oriented Architecture: Enterprise architecture-The service oriented architecture

**UNIT II ENTERPRISE APPLICATION INTEGRATION AND B2B COMMERCE (12)**

EAI-web services in portals and software development-managing the supply chain-Building hubs-Partner to Partner-Government and scientific SOA

**UNIT III REAL TIME OPERATIONS AND SECURITY: REAL TIME OPERATIONS (12)**

Goal of the real time enterprise-Delivering real time with the SOA –Real time virtual data warehouse-business level agreements. SECURITY: Risk of loose coupling-layers of SOA security-Solutions to SOA security

**UNIT IV SOA MANAGEMENT SOLUTION AND SOA NETWORKS (12)**

Problems in the unmanaged SOA-web services management solutions-Managing the SOA network-Securing the SOA network and solutions-SOA network management-Utility computing in the SOA

**UNIT V PEOPLE AND PROCESS OF ENTERPRISE SOA (12)**

Exploring an SOA for titan-achieving consensus at titan-Grouping for SOA Training success Services discovery-Service creation-Selecting a platform-Forming an SOA plan and proceed

**TOTAL: 60**

**REFERENCES:**

1. Eric Pulier,Hugh Taylor, “ Understanding Enterprise SOA”, Dreamtech press, New Delhi, 2005.
2. Chris Peiris and Dennis Mulder, ”Pro WCF Practical Microsoft SOA implementation”, Apress, Berkeley, CA, USA, 2007.
3. Greg Lomow, Eric Newcomer, “Understanding SOA with Web Services”, Pearson Education, New Delhi, 2005.
4. Dan Woods, Thomas Mattern, “Enterprise SOA: Designing it for Business Innovation”, Shroff publishers, 2006.

## SEMESTER VI

<b>075230024</b>	<b>UNIX AND NETWORK PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

### **UNIT I INTRODUCTION TO UNIX (12)**

File System - General Purpose Utilities - Bourne Shell - Simple Filters - Line Editing with ex - The vi Editor - Advanced filters - Process - Communication and Scheduling - Programming with Shell

### **UNIT II SYSTEM STRUCTURE (12)**

Kernel architecture - Kernel data structure - Buffer Cache - Structure of Buffer pool - Scenarios for buffer retrieval - Reading and Writing disk blocks - Advantages and Disadvantages of buffer cache - Inode - Structure of regular file - Conversion of a pathname to an inode - Inode assignment to a new file - allocation of disk blocks.

### **UNIT III INTRODUCTION TO SYSTEM CALLS (12)**

Process states and transitions - Context of a process - Saving the context of a process - Manipulating Process address space - Process creation and termination - System Boot and INIT process - Process Scheduling - Multithreads - Concurrency and parallelism.

### **UNIT IV UNIX FILES (12)**

Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2. The standard I/O, formatted I/O, stream errors, streams and file descriptors, file and directory maintenance. Directory handling system calls

### **UNIT V INTERPROCESS COMMUNICATION (12)**

Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, file and record locking, other unix locking techniques, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC-message queues, semaphores and shared memory.

**TOTAL L: 60**

### **REFERENCES:**

1. Maurice J. Bach, "Design of the UNIX Operating System", Prentice Hall of India, 3<sup>rd</sup> Edition, New Delhi, 2004.
2. W. Richard Stevens, UNIX Network Programming, , 4th edition, 2002.
3. 3. Stephen G. Kochan, "Exploring The Unix", SAMS Publications, 3<sup>rd</sup> edition, New Delhi, 2002.

**075230027**

**ADVANCED DBMS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I DATABASE MANAGEMENT (12)**

Relational Data Model – SQL - Database Design - Entity-Relationship Model – Relational Normalization – Embedded SQL – Dynamic SQL – JDBC – ODBC.

**UNIT II ADVANCED DATABASES (12)**

Object Databases - Conceptual Object Data Model – XML and Web Data – XML Schema – Distributed Data bases – OLAP and Data Mining – ROLAP and MOLAP

**UNIT III QUERY AND TRANSACTION PROCESSING (12)**

Query Processing Basics – Heuristic Optimization – Cost, Size Estimation - Models of Transactions – Architecture – Transaction Processing in a Centralized and Distributed System – TP Monitor.

**UNIT IV IMPLEMENTING AND ISOLATION (12)**

Schedules – Concurrency Control – Objects and Semantic Commutativity – Locking – Crash, Abort and Media Failure – Recovery – Atomic Termination – Distributed Deadlock – Global Serialization – Replicated Databases – Distributed Transactions in Real World.

**UNIT V DATABASE DESIGN ISSUES (12)**

Security – Encryption – Digital Signatures – Authorization – Authenticated RPC - Integrity - Consistency - Database Tuning - Optimization and Research Issues.

**TOTAL : 60**

**REFERENCES:**

1. Philip M. Lewis, Arthur Bernstein, Michael Kifer, “Databases and Transaction Processing: An Application-Oriented Approach”, Addison-Wesley, 2002
2. R. Elmasri and S.B. Navathe, Fundamentals of Database Systems, 3<sup>rd</sup> Edition, Addison Wesley, 2004
3. Abraham Silberschatz, Henry. F. Korth, S.Sudharsan, Database System Concepts, 4<sup>th</sup> Edition., Tata McGraw Hill, 2004
4. Raghu Ramakrishnan & Johannes Gehrke, “Database Management Systems”, 3<sup>rd</sup> Edition, TMH, 2003

**075230029**

**DISTRIBUTED OPERATING SYSTEMS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION (12)**

Fundamentals – evolution – System Models – Distributed operating System – Issues – Distributed Computing environment Message passing – Introduction – Features – Issues – Synchronization – Buffering – Message – Encoding – Decoding – Process addressing – Failure Handling.

**UNIT II REMOTE PROCEDURE CALL (12)**

Introduction – Model – Transparency – Implementation – Stub Generation – Messages – Marshaling Arguments and results –server Management – Parameter passing Semantics - Call Semantics – Communication Protocols – Complicated RPC’s – Client – Server Binding – Exception handling – Security Distributed shared Memory – Introduction – Architecture – Issues – Granularity Structure – Consistency Models – Replacement Strategy – Thrashing.

**UNIT III SYNCHRONIZATION (12)**

Introduction – Clock Synchronization – Event ordering – Mutual Exclusion – Deadlock – Election Algorithms.

**UNIT IV RESOURCE MANAGEMENT (12)**

Introduction – Features – Task Assignment approach – Load-Balancing Approach - Load -Sharing Approach Process Management – Introduction – Process Migration – Threads.

**UNIT V DISTRIBUTED FILE SYSTEMS (12)**

Introduction – Features – File Models – Accessing Models – Sharing Semantics – Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles Naming – Introduction – Features – Terminologies – Concepts.

**TOTAL: 60**

**REFERENCES:**

1. Pradeep K. Sinha, “Distributed Operating Systems, Concepts and Design” Prentice Hall of India, New Delhi, 2001.
2. Andrew S. Tanenbaum “Distributed Operating Systems”, Pearson Education, New Delhi, 2002
3. Mukesh Singhal and Nirajan G.Shivaratri “Advanced Concepts in Operating Systems”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2001

075230030

**SOFTWARE RELIABILITY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**UNIT I INTRODUCTION TO SOFTWARE RELIABILITY (12)**

Software Reliability Definitions - software disasters - Errors - faults - failures - different views of software reliability – software requirements specification - Causes of unreliability in software - Dependable systems: reliable, safe, secure, maintainable, and available - Software maintenance.

**UNIT II SOFTWARE RELIABILITY IMPROVEMENT (12)**

The phases of a Software Project - Monitoring the development process – The software life cycle models - software engineering - Structured Analysis and structured Design - Fault tolerance - Inspection - Software cost and schedule.

**UNIT III SOFTWARE QUALITY MANAGEMENT (12)**

Software quality modeling - Diverse approaches and sources of information - Fault avoidance, removal and tolerance - Process maturity levels (CMM) - Software quality assurance (SQA) - Monitoring the quality of software - Total quality management (TQA) - Measuring Software Reliability - The statistical approach - Software reliability metrics.

**UNIT IV SOFTWARE RELIABILITY TECHNIQUES AND TOOLS (12)**

Data Trends - Complete prediction Systems - overview of some software reliability models - The recalibration of the models - Analysis of model accuracy - Reliability growth models and trend analysis - Software Costs Models - Super models.

**UNIT V SOFTWARE RELIABILITY ENGINEERING PRACTICE (12)**

Testing and maintaining more reliable software –logical testing – functional testing – algorithm testing – regression testing - fault tree analysis – failure mode effects and critical analysis – reusability - case studies.

**TOTAL: 60**

**REFERENCES:**

1. Michael.R.Lyu, Handbook of Software Reliability Engineering, 2nd edition, 2004.
2. J.D. Musa, A. Iannino and K.Okumoto, Software Reliability, Measurement, Prediction, Application, McGraw Hill, 2000.
3. J.D. Musa, Software Reliability Engineering, McGraw Hill, 2000.

## SEMESTER VIII

**075230041**

**SOFTWARE DESIGN**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I          DESIGN FUNDAMENTALS**

**(9)**

The nature of design process – Objectives – Design qualities, Assessing the design process, Design view points for software.

**UNIT II          DESIGN METHODOLOGIES**

**(9)**

Design practices, Design strategies – Top down and bottom up – Coupling and cohesion – Popular design methodologies – Function oriented and object oriented design, Design documentation.

**UNIT III          DESIGN MODELS**

**(9)**

Structural analysis and design technique, SSADM and real time design. Data design, mappings requirements into a software Architecture.

**UNIT IV          DETAILED DESIGN**

**(9)**

User interface Design – Task analysis and modeling – Interface design activities, implementation tools, comparison of design notations, structural programming.

**UNIT V          OBJECT ORIENTED DESIGN**

**(9)**

Object oriented concepts, object oriented analysis – OOA process, object – relationship model, system and object design process – Design patterns.

**TOTAL:45**

**REFERENCES:**

1. Pressman R.S., “Software Engineering”, 4<sup>th</sup> Edition, McGraw Hill Inc., 1996.
2. David Budgen, “Software Design”, Addison – Wesley, 1994.
3. Steve McConnell, “Code Complete”, Microsoft Press, 1996.
4. A.G.Suteliffe, “Human Computer Interface Design”, 2<sup>nd</sup> Edition, MacMillan, 1995.

075230042

**DATA WAREHOUSING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION TO DATA WAREHOUSING (9)**

Introduction , Definition and description , Need for Data Ware Housing, Need for strategic information , Failures of past Decision Support Systems , OLTP vs DWH – DWH Requirements – Trends in DWH – DWH Framework, Information Systems Framework (Zachman Framework) – Applications of DWH.

**UNIT II DATA WAREHOUSING ARCHITECTURE & DESIGN (9)**

Reference Architecture , Components of Reference Architecture – Data Ware House Building Blocks – Implementation , Physical Design Process, DWH Deployment Process.

DATABASE DESIGN : Dimensional Modeling , Basics , STAR Schema, Star Schema keys , Advantages of STAR Schema.

**UNIT III INTRODUCTION TO DATA MINING (9)**

Data Mining Tasks – Data Mining Vs KDD – Issues in Data Mining – DM Metrics – Data Mining and Databases – Data Mining Architecture – Future Trends. Data Cleaning – Data Transformation – Data Reduction.

**UNIT IV DATA MINING PRIMITIVES & LANGUAGES (9)**

Data Mining primitives – Data Mining Query Languages. Association Rules – Mining Single Dimensional Boolean Association Rules from Transactional Databases – Mining Multi Dimensional Association from Data Ware Houses.

**UNIT V CLASSIFICATION, PREDICTION & CLUSTER ANALYSIS (9)**

Issues regarding classification and prediction – Decision Tree – Bayesian Classification – Classifier Accuracy. Types of Data – Partitioning Methods – Hierarchical Methods. Mining Event Sequences – Visual DM – Text Mining – Web Mining.

**TOTAL: 45**

**REFERENCES:**

1. Paulraj Ponniah, “Data WareHousing Fundamentals “, John Wiley & Sons, 1<sup>st</sup> edition, 2003.
2. M.H.Dunham , “Data Mining : Introductory and Advanced Topics”, Prentice Hall , 2003
3. Arun k Pujari , “Data Mining Techniques”, University Press, 1<sup>st</sup> edition, New Delhi, 2003.
4. Mehmed Kantardzic, “Data Mining Concepts , Methods and Algorithms “, John Wiley & Sons , 1<sup>st</sup> edition, New Delhi, 2003.

**075230043**

**ARCHITECTURE OF UNIX & WINDOWS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION TO UNIX**

**(9)**

Introduction- The file system-Shell programming- Filters- Communication and Scheduling- File system commands- System Administration.

**UNIT II DESIGN ASPECTS OF UNIX**

**(9)**

Architecture of UNIX OS, UNIX Kernel, Kernel data structures- The buffer Cache- Internal Representation of files- The structure of Processor- Process control-Network communication.

**UNIT III INTRODUCTION TO WINDOWS**

**(9)**

Introduction-Operating System as resource manager, Multitasking, Multithreading, Monolithic & Microkernel Architecture, Client-server Model, Windows NT-client server Architecture.

**UNIT IV PROCESS & THREADS**

**(9)**

Process address space, process objects, thread objects, synchronization of threads, process structure, windows NT implementation of process & threads, Object Model Operating Systems Architecture: Executive Object, Object management, Object protection, Windows NT object implementation.

**UNIT V VIRTUAL MEMORY MANAGEMENT & KERNAL**

**(9)**

Virtual memory Management: Virtual memory, Memory sharing, Memory Protection, Virtual memory implementation of window NT. Kernel Functions: Context switching & Scheduling, Interrupt and Exception handling, Kernel features of windows/NT operating systems. I/O Systems: Object model, Uniform driver model, Asynchronous operation, I/O processing, Layered driver model,

**TOTAL : 45**

**REFERENCES:**

1. Sumicarl Das, "UNIX Concepts & Application:", Tata Mc Graw Hill ,2<sup>nd</sup> edition, New Delhi, 2000.
2. Jeny peek, Grace Todino, "Learning the Unix Operating System", O' Reily Publications, 5<sup>th</sup> edition, New Delhi, 2001.
3. Charlie Russel, Sharon Crawford, " Microsoft Windows XP Professional Resource Kit", Microsoft, 3<sup>rd</sup> edition New Delhi, 2005.
4. Shelley O'Hara, "Easy Microsoft Windows XP, Tata Mc Graw Hill, 4<sup>th</sup> edition, New Delhi, 2006.

075230044

**MIDDLEWARE TECHNOLOGIES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION (9)**

Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middleware.

**UNIT II JAVA COMPONENT TECHNOLOGIES (9)**

Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization – Enterprise Java Beans – Distributed Object models – RMI and RMI-IIOP.

**UNIT III CORBA TECHNOLOGIES (9)**

Java and CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – Application server – model driven architecture.

**UNIT IV COM AND .NET TECHNOLOGIES (9)**

COM – Distributed COM – object reuse – interfaces and versioning – dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting.

**UNIT V COMPONENT FRAMEWORKS AND DEVELOPMENT (9)**

Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment – component-oriented programming – Component design and implementation tools – testing tools - assembly tools.

**TOTAL: 45**

**REFERENCES:**

1. Clemens Szyperski, “Component Software: Beyond Object-Oriented Programming”, Addison Wesley, 2<sup>nd</sup> Edition 2002.
2. Ed Roman, “Enterprise Java Beans”, 3<sup>rd</sup> Edition, Wiley, 2004.
3. Andreas Vogel, Keith Duddy, “Java Programming with CORBA”, John Wiley & Sons 1998
4. Corry, Mayfield, Cadman, “COM/DCOM Primer Plus”, Tec media, 1<sup>st</sup> Edition, 1999

**075230033**

**EXTREME PROGRAMMING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION (9)**

Introducing C# - Understanding .Net: The C# environment – Overview of C# - Literals, Variables and Data Types – Operators and Expressions.

**UNIT II DECISION MAKING (9)**

Decision Making, Branching and Looping – if, if...else, switch, ...? : operators, while, do, for, foreach and jump in loops, Methods in C# - declaring methods, the main method, invoking methods, nesting methods, method parameters, pass by value and pass by reference, output parameters, Variable argument lists – Overloading methods.

**UNIT III ARRAYS (9)**

Arrays – Creating an array, Variable size arrays, Array list class – Manipulating Strings – Structures, Nested Structures – Enumerations, Initialization, base types and type conversion.

**UNIT IV CLASSES AND OBJECTS (9)**

Classes and Objects – Definition, Creating objects, Constructors and destructors, Nesting, Overloaded constructors, Inheritance and Polymorphism – classical, multilevel, hierarchical inheritances, Subclass, Subclass constructors, Overriding methods, Abstract Classes and Methods, Interfaces, Interfaces and Inheritance – Operator Overloading.

**UNIT V DELEGATES AND DECLARATION METHODS (9)**

Delegates – Declaration Methods, Initialization and Invocation, Multicast delegates, I/O operations – Console Input/Output, Formatting, Errors and Exceptions, Type of Errors – Exceptions – Exception for debugging.

**TOTAL: 45**

**REFERENCES:**

1. E. Balagurusamy, Programming in C#, Tata Mc-Graw Hill Publishing Company, New Delhi, 2002.
2. Selvi, T. A Text book on C# : A Systematic approach to object oriented programming, Pearson Education, Delhi, 2003.
3. Lippman, C# Primer, 3<sup>rd</sup> Edition, Pearson Education, Delhi, 2002.
4. Liberty, J. Programming C#, Second Edition, O'Reilly & Associates Inc., California, 2002.
5. Albahari, B. Prayton, P. and Marill, B. C# Essentials, O'Reilly & Associates Inc., California, 2002.

**075230022**

**COMPILER DESIGN**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION TO COMPILERS (9)**

Compilers, Analysis of the Source Program, The Phases of a Compiler, Cousins of the Compiler, The Grouping of Phases, Compiler-Construction Tools, Translators-Compilation and Interpretation, A simple one-pass compiler

**UNIT II LEXICAL ANALYSIS (9)**

Need and role of lexical analyzer-Lexical errors, Input Buffering - Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata, From a Regular Expression to an NFA, Design of a Lexical Analyzer Generator

**UNIT III SYNTAX ANALYSIS (9)**

Need and role of the parser- Context Free Grammars-Top Down parsing - Recursive Descent Parser - Predictive Parser - LL(1) Parser -Shift Reduce Parser - LR Parser - LR (0) item - Construction of SLR Parsing table -Introduction to LALR Parser, YACC- Design of a syntax analyzer for a sample language

**UNIT IV SYNTAX DIRECTED TRANSLATION AND TYPE CHECKING (9)**

Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, Top Down Translation, Bottom-Up Evaluation of Inherited Attributes, Forms of intermediate code -Translation of Assignment, Boolean Expression and Control statements - Back patching type systems - Specification of a simple type checker - equivalence of type expressions - type conversions

**UNIT V RUN-TIME ENVIRONMENT AND ERROR HANDLING (9)**

Source language issues-Storage organization-Storage allocation-parameter passing-Symbol tables-Dynamic storage allocation-Storage allocation in FORTRAN, Error handling and recovery in different phases Principal sources of Optimization – DAG - Optimization of basic blocks-Global data flow analysis - Efficient data flow algorithms - Issues in design of a code generator-a simple code generator algorithm

**TOTAL :45**

**REFERENCES:**

1. Alfred V.Aho, Ravi Sethi and Jeffrey D.Ullman, "Compilers – Principles, Techniques and Tools", second edition, Pearson Education, New Delhi, 2006.
2. Dhamdhere D M, "Compiler Construction Principles and Practice", second edition, Macmillan India Ltd., New Delhi, 2001.
3. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", McGraw Hill, New Delhi, 2001.
4. Dick Grone, Henri E Bal, Cerial J H Jacobs and Koen G Langendoen, "Modern Compiler Design", John Wiley, New Delhi, 2000.

## SEMESTER - IX

075580022

### CRYPTOGRAPHY

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#### UNIT I CONVENTIONAL AND MODERN ENCRYPTION (9)

Services – Attacks – Steganography - Classical Encryption Techniques – DES – Differential and Linear Cryptanalysis – Modes of operation – Encryption Algorithms – Triple DES – Blowfish – CAST128

#### UNIT II PUBLIC KEY ENCRYPTION (9)

Uniqueness – Number Theory concepts – Primality – Modular Arithmetic – Fermat & Euler Theorem – Euclid Algorithm – RSA Algorithm – Elliptic Curve Cryptography – DiffieHellmanKeyExchange

#### UNIT III AUTHENTICATION AND SECURITY PRACTICE (9)

Digests – Requirements – MAC – Hash function – Security of Hash and MAC – Birthday Attack – MD5 – SHA – RIPEMD – Digital Signature Standard - Authentication applications – Kerberos – Kerberos Encryption Techniques – PGP– IP Security Architecture– Web security – SSL – TLS – SET

#### UNIT IV PUBLIC- KEY INFRASTRUCTURE (9)

Legislation - Regulation and Guidelines, Non-repudiation - Certification Policies and Practices- Public-Key Infrastructure Assessment and Accreditation

#### UNIT V SYSTEM SECURITY & STANDARDS (9)

Intruders and Intrusion – Viruses and Worms – OS Security – Firewalls – Design Principles – Packet Filtering – Application gateways – Trusted systems – Counter Measures. Blueprint for Security – Information Security Policy – Standards and Practices – ISO 17799/BS 7799 – NIST Models – VISA International Security Model – Design of Security Architecture – Planning for Continuity.

**TOTAL L: 45**

#### REFERENCES:

1. William Stallings, “Cryptography & Network Security”, Pearson Education, 5<sup>th</sup> edition. New Delhi 2005.
2. Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security, Private Communication in a Public World”, Prentice Hall of India, 1<sup>st</sup> edition, New Delhi, 2002.
3. Bruce Schneier, Niels Ferguson, “Practical Cryptography”, Wiley Dreamtech India Pvt Ltd, 1<sup>st</sup> edition, New Delhi, 2003.

**075580023**

**PARALLEL COMPUTING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION (9)**

Computational demands of Parallel Processing, Mechanisms of implementing parallel processing, Parallel Processing terminology's, Major issues in Parallel Processing.

**UNIT II PARALLEL ARCHITECTURES (9)**

Loosely Coupled Systems, Tightly Coupled Systems, Interconnection networks: Linear and Ring, Shuffle Exchange, Two Dimensional Mesh, Hybercube.

**UNIT III PRINCIPLES OF PARALLEL PROGRAMMING (9)**

Precedence Graph of a Process, Data, Control, Temporal Parallelism, Message Passing Versus Shared Address space, Mapping, Granularity.

**UNIT IV PRINCIPLES OF PARALLEL ALGORITHM DESIGN (9)**

Design Approaches, Design issues, Performance measures and Analysis, Complexities, Anomalies in Parallel Algorithms, Case Study, Parallel Search Algorithms. A model for parallel computation, Some basic techniques, Computing with a complete binary tree, Pointer doubling –Parallel evaluation of expressions, Parallel sorting networks, The zero-one principle, Parallel merging networks, Improved sorting networks, Parallel sorting

**UNIT V SHARED MEMORY MULTIPROCESSOR SYSTEMS (9)**

Shared bus, Cross Bar, Multiport memory, Memory contention and Arbitration Techniques, Cache Coherence, Handling Shared Variables.

**TOTAL :45**

**REFERENCES:**

1. Seyed.H.Roosta, "Parallel Programming and Parallel Algorithms", Springier Series, New York, 2001.
2. Michael.J.Quinn, "Parallel Computing Theory and Practice", McGraw Hill, Singapore, 2003.
3. Kai Hwang and Feye A.Briggs, "Computer Architecture and Parallel Processing", Tata McGraw Hill, New Delhi, 2001.
4. Barry Wilkinson, "Parallel Programming", Pearson Education, New Delhi, 2002.

**075580024**

**C # AND . NET PROGRAMMING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION TO C# 9**

Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

**UNIT II OBJECT ORIENTED ASPECTS OF C# 9**

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

**UNIT III APPLICATION DEVELOPMENT ON .NET 9**

Building Windows Applications, Accessing Data with ADO.NET.

**UNIT IV WEB BASED APPLICATION DEVELOPMENT ON .NET 9**

Programming Web Applications with Web Forms, Programming Web Services.

**UNIT V THE CLR AND THE .NET FRAMEWORK 9**

Assemblies, Versioning, Attributes, Reflection, Viewing MetaData, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using SingleCall, Threads.

**TOTAL : 45**

**REFERENCES:**

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004. J. Liberty, "Programming C#", 2<sup>nd</sup> ed., O'Reilly, 2002.
2. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2004.
3. Robinson et al, "Professional C#", 2<sup>nd</sup> ed., Wrox Press, 2002.
4. Andrew Troelsen, "C# and the .NET Platform", A! Press, 2003.
5. S. Thamarai Selvi, R. Murugesan, "A Textbook on C#", Pearson Education, 2003.

**075580027**

**SOFT COMPUTING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION AND FUZZY SETS, RULES AND REASONING (9)**

Introduction to Soft Computing, History, State of the Art, Trend and Applications .Basic definitions and terminology, set theoretic operations, MF Formulation, Fuzzy extension principle and relations, Fuzzy IF –Then, Rules – Fuzzy reasoning

**UNIT II FUZZY INFERENCE SYSTEMS (9)**

Mamdani Fuzzy models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Defuzzification strategies .

**UNIT III SUPERVISED LEARNING NEURAL NETWORK (9)**

Back propagation networks, Single layer and Multi layer perceptron networks, Adaline, Madaline, radial basis function network .

**UNIT IV UNSUPERVISED LEARNING NEURAL NETWORK (9)**

Competitive learning networks, Kohonen self organizing networks, Hebbian learning, Principal Component networks, Hopfield networks

**UNIT V GENETIC ALGORITHMS (9)**

Introduction – Terminology's – Genetic operators – Selection, cross-over, reproduction and mutation – fitness function – a simple genetic algorithm – hybrid genetic algorithm, Applications, Function maximization and word matching problem using genetic algorithm

**TOTAL :45**

**REFERENCES:**

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, and Eiji Mizutani, "Neuro Fuzzy and Soft computing: A Computational Approach to Learning and Machine Intelligence", Prentice Hall, New Delhi, 1986.
2. Goldberg, David E., "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, New Delhi, 1989.
3. Robert J Schalkff, "Artificial Neural Networks", McGraw Hill, New Delhi, 1997.
4. Dhilip .D. Wasserman, "Neural Computing", Van Nostrand Rein hold, London, 1989.
5. Timothy J. Ross, "Fuzzy Logic with Engineering Application", Tata McGraw Hill, New Delhi, 2004.

**075230023**

**ARTIFICIAL INTELLIGENCE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I INTRODUCTION (9)**

Intelligent Agents – Agents and environments - Good behavior – The nature of environments – structure of agents - problem solving agents – example problems – searching for solutions – uniformed search strategies - searching with partial information.

**UNIT II SEARCHING TECHNIQUES (9)**

Informed search and exploration – Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments - Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems - Adversarial Search — Alpha – Beta Pruning – imperfect real-time decision

**UNIT III KNOWLEDGE REPRESENTATION (9)**

First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – propositional versus first order logic –forward, backward chaining –Resolution - Knowledge representation - Actions - Simulation and events - Mental events

**UNIT IV LEARNING (9)**

Learning from observations - forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning – Explanation based learning – Statistical learning methods - Learning with complete data - Learning with hidden variable - EM algorithm - Instance based learning - Neural networks - Active reinforcement learning - Generalization in reinforcement learning.

**UNIT V APPLICATIONS (9)**

Communication – Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation – Discourse understanding – Grammar induction - Probabilistic language processing - Probabilistic language models – Information retrieval – Information Extraction – Machine translation.

**TOTAL : 45**

**REFERENCES:**

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, Pearson Education / Prentice Hall of India, 2004.
2. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
3. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2<sup>nd</sup> Edition, Tata McGraw-Hill, 2003.

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**PROFESSIONAL ETHICS**

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<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I ENGINEERING ETHICS (9)**

Senses of 'engineering ethics' – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – Kohlberg's theory – Gilligan's theory – consensus and controversy – professions and professionalism – professional ideals and virtues – theories about right action – self-interest – customs and religion – uses of ethical theories.

**UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION (9)**

Engineering as experimentation – engineers as responsible experimenters – codes of ethics – a balanced outlook on law – the challenger case study.

**UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY (9)**

Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk – the three mile island and Chernobyl case studies.

**UNIT IV RESPONSIBILITIES AND RIGHTS (9)**

Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – intellectual property rights (IPR) – discrimination

**UNIT V GLOBAL ISSUES (9)**

Multinational corporations – environmental ethics – computer ethics – weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – sample code of conduct

**TOTAL : 45**

**REFERENCES:**

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 1996.
2. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
3. Laura Schlesinger, "How Could You Do That: The Abdication of Character, Courage, and Conscience", Harper Collins, New York, 1996.
4. Stephen Carter, "Integrity", Basic Books, New York, 1996.
5. Tom Rusk, "The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life", Viking, New York, 1993