NMAM. INSTITUTE OF TECHNOLOGY, NITTE.
(AN AUTONOMOUS INSTITUTION UNDER VTU, BELGAUM)
DEPARTMENT OF MCA

TOTAL CREDIT DISTRIBUTION:

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13MCA503  - Design and Analysis of Algorithms (4-0-0)
13MCA51Y  - Elective - 2 (2-2-0)
13MCA52Y  - Elective -3 (2-2-0)
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13MCA505  - WEB 2.0 and Rich Internet Applications Lab (0-0-4)
13MCA506  - Mini Project (0-0-4)

13MCA601  - Major Project (0-0-35)

Elective Courses:

Group-1
13MCA411  - Enterprise Resource Planning (2-2-0)
13MCA412  - Supply Chain Management (2-2-0)
13MCA413  - Mobile Computing and Wireless Communications (2-2-0)
13MCA414  - Client Server Computing (2-2-0)

Group-2
13MCA511  - Data Warehousing and Data Mining (2-2-0)
13MCA512  - Cryptography and Network Security (2-2-0)
13MCA513  - Advanced Topics in DBMS (2-2-0)
13MCA514  - Parallel Computing (2-2-0)

Group-3
13MCA521  - Cloud Computing (2-2-0)
13MCA522  - Computer Graphics (2-2-0)
13MCA523  - Building Enterprise Applications (2-2-0)
13MCA524  - Unix System Programming (2-2-0)
### I Semester MCA

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Master of Computer Applications

FIRST SEMESTER

UNIX concepts and programming

Subject Code: 13MCA101
CIE Marks : 50
Hours/Week: 04
SEE Marks: 50
Total Hours: 52
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UNIT-1 10 Hours


Commands: General purpose utilities, File system commands, Commands to handle ordinary files.

Basic File Attributes: ls -l, -d option, file permissions, chmod, Changing file ownership.
vi editor: vi basics, input mode, saving- ex mode, navigation, editing text, undoing last editing instructions, repeating the last command, pattern search, substitution.

UNIT-2 10 Hours

Shell: Shell’s interpretive cycle, Shell offerings, Pattern matching- wild cards, escaping and quoting, redirection, /dev/null and /dev/tty, pipes, tee, Command substitution, Shell variables, Shell’s treatment of the command line.

Process: Process basics, ps, system processes, Mechanism of process creation, Internal and external commands, Running jobs in background, nice, Killing processes with signals, Job control, at and batch, cron, time.

Customizing the Environment: Shells, Environment Variables, Common Environment Variables, Profile , aliases, command history, inline command editing.

More File attributes: File systems and inodes, Hard links, Symbolic links and ln, directory, Umask, modification and access times, find.

UNIT-3 10 Hours

Simple filters: Sample database, pr, head, tail, cut, paste, sort, uniq, nl, tr commands.

Filters using regular expressions: grep, basic regular expression, extended regular expression and egrep, fgrep.
Essential Shell Programming: Shell Scripts, read, Command line Arguments, exit and exit status of a command, Logical Operators && and ||, if conditional, using tests and [] to evaluate expression, Case conditional, expr, sleep and wait, $0 variable, while, until, for, @, set and shift, redirection, the here document, trap, debugging shell scripts.

UNIT-4 12 Hours

Essential System Administration: root, Administrator’s Privileges, Maintaining security, user management, startup & shutdown, Managing disk space, Device files, handling floppy diskettes, cpio, tar.

Advanced Shell Programming: Shells and sub shells, Using Sub-shell and current shell, export, running a script in the current shell, Conditional parameter substitution, merging streams, Shell functions, Eval, exec statement.

Perl: Introduction, Chop function, Specifying the interpreter, Variables and Operators, String Handling Functions, Specifying file names in command line, Default Variable, Current line number and range operator, Lists and arrays, For each, split, join, Searching an array for a pattern, Associative arrays, Simple examples of regular expressions and substitution, File handling, subroutines.

UNIT-5 10 Hours

Advanced System Administration: Password aging, Restricted shell, Allowing user to shutdown only, partitions and file systems, standard file systems and their types, fdisk, mkfs, Mounting and unmounting file systems, fsck, system startup and init, Shutdown and sync operation, backups.

awk-Advanced Filter: Simple awk filtering, Splitting a line in to fields, printf, Variables and expressions, Comparison operators, Number processing, -f option, BEGIN and END sections, Built in variables, Arrays, Functions, Control flow, Looping with for, Looping with while, Interface with the Shell.

Text Books


Reference Books

Master of Computer Applications

FIRST SEMESTER

C concepts and programming

Subject Code: 13MCA102
CIE Marks: 50
Hours/Week: 04
SEE Marks: 50
Total Hours: 52
SEE Hours: 03

UNIT I

Basics of C
Algorithms; Flowcharts; Constants, Variables and Data Types Operators and Expressions, Managing Input and Output Operations, Branching and looping using Decision Making statements.

UNIT II

Arrays
One Dimensional Arrays; Two Dimensional Arrays; Multidimensional arrays; Dynamic Arrays; Character Arrays and Strings.
Structures and Unions
Defining a Structure; Declaring Structure variables; Accessing Structure Members; Structure Initialization; Copying and Comparing Structure Variables; Operations on Individual Members; Array of Structures, Structures within Structures; Unions.

UNIT III

User-defined Functions
Need for user-defined functions; A multi function program; Elements of User - defined functions; Defining Functions; Return Values and their Types; Function Calls; Function Declaration; Category of Functions; No Arguments and no Return Values; Arguments but no Return values; Arguments with Return values; No Arguments with Return Value; Functions that Return Multiple Values; Nesting of Functions; Recursion. Passing arrays and string to function; Structures and Functions;
UNIT IV

12 Hours

Pointers
Understanding Pointers; Chain of Pointers; Pointer Expressions; Pointers and Arrays; Pointer and Character Strings; Array of Pointers; Pointer as Function Arguments; Functions Returning Pointers; Pointers to Functions; Pointers and Structures

File Management in C
Defining and Opening a File; Closing a File; Input / Output Operations on Files; Error Handling during I/O Operations; Random Access Files; Command Line Arguments

UNIT V

10 Hours

Dynamic memory allocation an list
Dynamic Memory Allocation; malloc; calloc; Free; realloc.
Creating a node, Inserting a node front of a list, removing a node from the front of a list.

The Preprocessor
Introduction; Macro Substitution; Files Inclusion; Compiler Control Directives; ANSI Additions; Programming Exercises.

Text Books

Reference Books
3. R G Dromey : How to Solve it by Computer, Prentice-Hall India.
Master of Computer Applications

FIRST SEMESTER

Fundamentals of Computer Organization

Subject Code: 13MCA103
Hours/Week: 04
Total Hours: 52
CIE Marks : 50
SEE Marks : 50
SEE Hours : 03

UNIT-1 12 Hours

Number Systems and Logic Gates and Combining Logic Gates
Counting in Decimal and Binary; Place Value; Binary to Decimal Conversion; Decimal to Binary Conversion; Hexadecimal Numbers; Octal Numbers; Bits; Bytes; Nibbles, and Word Size; The AND Gate; The OR Gate; The Inverter and Buffer; The NAND Gate; The NOR Gate; The Exclusive OR Gate; The Exclusive NOR Gates; The NAND Gate as an Universal Gate; Gates with more than Two Inputs; Using Inverters to Convert Gates.

Combining Logic Gates
Constructing Circuits from Boolean Expression; Drawing a Circuit from a Maxterm Boolean Expression; Truth Tables and Boolean Expressions; Sample problem; Simplifying Boolean Expression; Karnaugh Maps; Karnaugh Maps with Three Variables; Karnaugh Maps with Four variables; More Karnaugh Maps; Using Demorgan’s theorem.

UNIT-2 10 Hours

Arithmetic Circuits and Arithmetic Unit
Binary Addition; Half Adders; Full Adders; Three Bit Adders; Binary Subtraction; Parallel Subtractors; 2’s Complement Notation; Addition & Subtraction of Signed Numbers; 2’s Complement Adders/Subtractor.; Design of Fast Adders; Binary Multiplication; Multiplication of Positive Numbers; Binary Multipliers; Signed-Operand Multiplication; Fast Multiplication; Integer Division; Floating-Point Numbers & Operations.

UNIT-3 10 Hours

Basic Structure of Computer
Computer Types; Functional Units, Basic operational concepts; Bus Structures; Performance; Memory Location and Addresses.

Machine Instruction and Programs
Memory Operations; Instructions & Instruction Sequencing; Addressing Modes; Assembly Language; Basic Input/Output Operations.
UNIT-4  
10 Hours

Input/Output Organization
Accessing I/O Devices; Interrupts; Direct Memory Accesses; Buses; Interface Circuits.

UNIT-5  
10 Hours

Memory Systems
Some Basics Concepts; Semiconductor RAM Memories; Read-Only Memories; Cache Memories, Virtual Memories.

Text Books

Reference Books
Master of Computer Applications

FIRST SEMESTER

Discrete Mathematical Structures

Subject Code: 13MCA104
CIE Marks : 50

Hours/Week: 04
SEE Marks : 50

Total Hours : 52
SEE Hours : 03

UNIT-1 12 Hours

Mathematical Logic
Statements and Notation; Connectives: Negation, Conjunction, Disjunction, Statement Formulas and Truth Tables, Well Formed Formulas, Tautologies, Equivalence of Formula, Duality Law, Tautological Implications, Logical Equivalence; Normal Forms: Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms, Principal Conjunctive Normal Forms; The Theory of Inference for the Statement Calculus: Validity Using Truth Table, Rules of Inference, Consistency of Premises.

UNIT-2 12 Hours

Set Theory
Basic concepts of Set theory, Notation, Inclusion and Equality of sets, Power set, Some operations on sets, Venn Diagrams, Some basic set Identities, Ordered pairs and n-tuples, Cartesian Products; Permutation and Combination: Rules of Sum and Product; Pigeon hole Principle.

Relations and Ordering
Relations; Properties of Binary Relations; Relation Matrix and Graph of a Relation; Partition and Covering; Equivalence Relations; Compatibility Relations; Composition of Binary Relations; Partial Ordering; Partially Ordered Set.

UNIT-3 08 Hours

Recurrence Relations and Generating Functions
Recurrence Relations; Linear Recurrence Relations with constant coefficients; Backtrack Method; Homogenous Solutions, Particular Solutions; Total Solutions.

Functions
Definition and Introduction; Composition of Functions; Inverse Function; Characteristic Function of a set; Recursive Functions.
UNIT-4

Graph Theory
Basic Terminology; Multi graphs of weighted graphs, Paths and Circuits; Shortest paths in weighted graphs; Eularian Paths and Circuits; Hamiltonian Circuits; Traveling Salesman Problem. Trees: Rooted Trees; Path Lengths in Rooted Trees; Prefix Codes; BinarySearchTrees; Spanning Trees; Minimum Spanning Trees.

UNIT-5

Algebraic Structures
Semi Groups and Monoids: Definition and Examples; Homomorphism of Semi Groups and Monoids; Sub Semi groups and Sub Monoids; Groups: Definition and Examples; Sub Groups and Homomorphism; Cosets and Lagrange's theorem; Normal Subgroups.

Text Books :

Reference Book :
Master of Computer Applications

FIRST SEMESTER

Professional Communication and Ethics

Subject Code : 13MCA105

CIE Marks : 50

Hours/Week : 04

SEE Marks : 50

Total Hours : 52

SEE Hours : 03

UNIT-1 10 Hours

- **Communication Theory** - Concept and meaning of communication, Objectives of communication, Methods of communication, Communication in a business organization Process of communication (Internal, upward, downward horizontal, grapevine) Cycle of Communication and Feedback, Language as a tool.


UNIT-2 12 Hours

- **Listening Skills** - What is Listening?, Types of Listening, Objectives, Active Listening - Effective Listening Skill, Note Taking Tips, Barriers for Good Listening, Purpose of listening

- **Reading Skills** - Importance of Reading, Definition of Reading, Levels of Reading Requirements of Reading, Types of Reading, Techniques of Reading, Academic Reading Tips


UNIT-3 12 Hours

- **Speaking Skills** - Importance of speaking skill (interpersonal & professional) Effective Presentation Strategies - Introduction, Defining purpose, Analyzing audience and locale, Organizing contents, preparing outline, Visual aids, Understanding nuances of delivery, Kinesics, Proxemics, Para linguistics, Chronemics,
• **Group Communication**
  Introduction, Group discussion, Organizational group discussion, Group
discussion as part of selection process, meetings, conferences.

• **English Grammar and Vocabulary** --Tenses, Common errors in English,
  Synonyms, Antonyms, interrogative and negative sentences.

**UNIT-4**

• **Human Values**
  Morals, values & Ethics, Civic virtue, respect for others, Work Ethic

• **Ethics for IT Professionals and IT users**
  IT professionals, The ethical behavior of IT professionals, IT users, Valuing Time
  Co-operation, Commitment.

**UNIT-5**

• **The impact of IT on the quality of Life**
  Digital Divide in healthcare, IT Impact on standard of living and productivity.

• **Responsibilities and Rights**
  Professional Rights, Employee Rights, Discrimination, Use of nontraditional
  workers RTI-Whistle blowing.

• **Introduction to Intellectual Property law**
  Basics, agencies responsible for Intellectual Property registration, Patent,
  Introduction to Cyber law.

• **Case Study:**
  Listening exercises, Comprehension of reading skills & writing skills & Case study
  of whistle blowers & ethics issues.

**Text Books**

1. Meenakshi Raman and Sangeeta Sharma: Technical Communication - Principles and
2. George Reynolds : Ethics in Information Technology, Thomson Course Technology,
   2003.

**Reference Books**

   Hill.
   TataMcGraw Hill.
1. Develop shell scripts to demonstrate the utility of basic Unix commands like echo, pwd, who, grep, sort, cut, paste, pipe, tee, cat, more, tty, stty, spell and such other simple commands/filters using appropriate Unix/Linux platform.

2. Write simple awk scripts using BEGIN and END sections, arrays, special variables and built-in functions.

3. Implementation of Perl programs.
Master of Computer Applications

FIRST SEMESTER

C Programming Lab

Subject Code : 13MCA107  CIE Marks : 50
Hours/Week : 04  SEE Marks : 50
Total Hours : 48  SEE Hours : 03

1. Programs using data types and I/O statements.
2. Implementation of control structures.
3. Implementation of iterative statements.
4. Programs using arrays.
5. Creating user defined functions.
6. Programs using recursion.
7. Implementation of structures and unions.
8. Programs using command line arguments.
9. Programs using pointers to variables, arrays, structures and functions.
10. Dynamic allocation for pointers.
11. Programs implementing the use of files.
12. Programs using preprocessor statements.
13. Implementation of list.
Master of Computer Applications

FIRST SEMESTER

DTP Lab

Subject Code: 13MCA108
Hours/Week: 04
Total Hours: 48

CIE Marks : 50
SEE Marks : 50
SEE Hours : 03

PART A

Exercises on the following topics to be conducted in the laboratory using any of the very widely used current software packages

1. Word Processing: Preparation of business letters, project proposals, etc. Experimenting with all manipulation facilities like bold facing, Italicizing, Alignment cut and paste, spell checking including headers and footers, etc., Use of Mail-merge facility.

2. Computer Presentation: Learning commands, Preparation of slides, inserting texts, Graphs, etc., color changing, automatic presentation of slides, changing time settings, object linking and embedding, etc.

3. Photoshop: Basics of Photoshop, like creating, editing images.

4. Animation: Creating, editing animations.
Master of Computer Applications
SECOND SEMESTER
Object Oriented Programming with C++

Subject Code: 13MCA201
CIE Marks: 50
Hours/Week: 04
SEE Marks: 50
Total Hours: 52
SEE Hours: 03

UNIT-1
8 Hours

Introduction
Overview of C++, Sample C++ program, Different data types, operators, expressions, and statements, arrays and strings, pointers & user-defined types Function Components, argument passing, inline functions, function overloading, recursive functions

UNIT-2
12 Hours

Classes and Objects
Classes; Structures and Classes are Related; Unions and Classes are Related; Friend Functions; Friend Classes; Inline Functions; Parameterized Constructors; Static Class Members; When Constructors and Destructors are executed; The scope resolution Operator; Nested Classes; Local Classes; Passing Objects to Functions; Returning Objects; Object assignment.

Arrays, Pointers, References and the Dynamic Allocation Operators
Arrays of Objects; Pointers to objects; The this pointer; Pointers to class members; References; Dynamic allocation operators.

UNIT-3
10 Hours

Operator Overloading
Creating a member operator function; Operator Overloading using Member Function and Friend Function; Overloading new and delete; overloading some special operators; Overloading the comma operator.

Inheritance
Base class access control; Inheritance and protected members- Protected base class inheritance: Inheriting multiple base classes; Constructors, Destructors and inheritance; Pointers to derived types.
UNIT-4

Virtual Base classes, Virtual Functions and Polymorphism
Virtual Base classes, Virtual functions - Calling a virtual function through a base class reference: The virtual attribute is inherited; Virtual functions are hierarchical; Pure virtual functions - abstract classes; Using virtual functions, Early vs late binding.

UNIT-5

I/O System Basics, File I/O
C++ stream classes, Formatted I/O, I/O manipulators, fstream and the File classes, File operations

Templates and Exception Handling
Generic functions and classes; Exception handling fundamentals, Exception handling options.

Text Books:

Reference Books:
1. K R Venugopal, Rajkumar T, Ravi Shankar: Mastering C++, TMH.
UNIT-1

Introduction to Operating Systems and System Structures

Real time OS

Process
Process Concept: Scheduling, Operation on Processes, Inter process Communication.

UNIT-2

Multithreaded Programming
Multithreading Models, Pthreads, Java Threads, Threading Issues;

Process Scheduling
Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling.

Process Coordination
Synchronization: The Critical-Section Problem, Peterson’s Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors; Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.
UNIT-3 12 Hours

Memory Management

Virtual Memory Management
Background, Demand Paging, Copy-on-write, Page Replacement, Allocation of frames, Thrashing.

UNIT-4 10 Hours

Storage Management

Protection

UNIT-5 8 Hours

Security

Case Studies: Linux Operating System

Text Book :

Reference Books:
2. Harvey M. Deitel : Operating Systems, Addison Wesley
Master of Computer Applications
SECOND SEMESTER

Data Structures

Subject Code: 13MCA203
CIE Marks : 50

Hours/Week: 04
SEE Marks : 50

Total Hours : 52
SEE Hours : 03

UNIT-1 10 Hours

Introduction
Introduction to data structure, Abstract data type, Overview of C: Data types in C, Arrays, Structures and Pointers, sparse matrices, polynomials.

Stacks
Definition and Primitive operations, Representing and implementing stacks in C, Applications of stacks: Evaluating a postfix expression, converting an expression from infix to postfix.

UNIT-2 10 Hours

Recursion
Recursion: definition and processes, Implementation of recursion program in C, examples (Factorial function, Multiplication of natural numbers, Fibonacci sequence, Binary search, Towers of Hanoi problem)

Queues
Definition and Primitive operations, C implementation of ordinary queues and circular queues, Priority queues, Array implementation of a priority queue.

UNIT-3 12 Hours

Lists
Introduction to Linked lists, Types of linked lists, C implementation of Singly Linked Lists, Doubly linked lists, Circular lists, stacks and queues, Programming examples of lists.

UNIT-4 10 Hours

Graphs and Trees
Graphs: Definitions, Application of graphs, C representation of graphs, Graph traversal
UNIT-5

10 Hours

Sorting and Searching
Bubble Sort, Quick Sort, Selection Sort, Binary Tree Sort, Heap Sort, Simple Insertion sort, Shell Sort, Merge Sort
Sequential searching, Indexed sequential search, Binary search, Interpolation search.
Binary Search Tree, Hashing: Resolving hash clashes by open addressing.

Text Books:


2. Jean-Paul Tremblay: An Introduction to Data Structures with applications, Tata McGRAW Hill

Reference Books:

Master of Computer Applications

SECOND SEMESTER

Systems Software

Subject Code: 13MCA204
CIE Marks :50

Hours/Week: 04
SEE Marks :50

Total Hours: 52
SEE Hours :03

UNIT-1 8 Hours

Machine Architecture
Introduction; System software and machine architecture; The simplified instructional
computer (SIC): SIC machine architecture, SIC/XC machine architecture, SIC
programming examples; Traditional (CISE) machines: VAX architecture; RISC
machines: ultra SPARC architecture.

UNIT-2 12 Hours

Assemblers
Basic assembler functions: a simple sic assembler, assembler algorithm and data
structures; Machine-dependent assembler features: instruction formats & addressing
modes, program relocation; Machine-independent assembler features: literals, symbol-
defining statements, expression, program blocks, control sections and program linking;
Assembler design options: one-pass assembler, multi-pass assembler; Implementation
examples: MASM assembler, SPARC assembler.

Macro Processor
Basic macro processor functions: macro definitions and expansion, macro processor
algorithm and data structures; Machine-independent macro processor features:
concatenation of macro parameters, generation of unique labels, conditional macro
expansion, keyword macro parameters; Macro processor design options: recursive macro
expansion, general-purpose macro processors, macro processing within language
translators; Implementation examples: MASM macro processor, ANSI C macro
language.

UNIT-3 12 Hours

Loaders and Linkers
Basic loader functions: design of an absolute loader, a simple bootstrap loader; machine-
dependent loader features: relocation, program linking, algorithm and data structures for
a linking loader; machine-independent loader features: automatic library search, loader
options; Loader design options: linkage editor, dynamic linking, bootstrap loaders;
implementation examples: ms-dos linker, sun OS linker.
Editors and Debugging Systems
Text editors: overview of editing process, user interface, editor structure; Interactive debugging systems: debugging functions and capabilities, relationship with other parts of the system, user-interface criteria.

UNIT-4 12 Hours

Compilers
Basic compiler functions: grammars, lexical analysis, syntactic analysis, code generation; Machine-dependent compiler features: intermediate form of the program, machine-dependent code optimization; Machine-independent compiler features: structured variables, machine independent code optimization, storage allocation, block structured languages; Compiler design options: division into passes, interpreters, compiler-compilers.

UNIT-5 8 Hours

Lex and Yacc
The simplest lex program; Recognizing words with LEX: symbol tables; Grammars: Parser-Lexer communication, the parts of speech lexer, A YACC parser, the rules section; Running LEX and YACC; LEX vs. hand-written lexers.

Using LEX
Regular expression: examples of regular expressions; A word counting program; Parsing a command line: starts states.

Using YACC
Grammars; Recursive rules; Shift/Reduce parsing: what YACC cannot parse; A YACC parser: the definition section, the rules section, symbol values and actions; The LEXER: compiling and running a simple parser; Arithmetic expressions and ambiguity; Variables and typed tokens.

Text Books:


Reference Book:

Master of Computer Applications
SECOND SEMESTER
Probability Statistics and Queuing

Subject Code : 13MCA205
CIE Marks : 50
Hours/Week : 04
SEE Marks : 50
Total Hours : 52
SEE Hours : 03

UNIT-1 10 Hours

Probability
The concept of probability, The axioms of probability, Some important theorems on Probability, Assignment of probabilities, Conditional Probability, Theorems on conditional probability, Independent Events, Bayes’ Theorem.

UNIT-2 10 Hours

Random Variables and Probability Distributions:
Random Variables, Discrete probability distributions, Distribution functions for discrete random variables, Continuous probability distributions, Distribution functions for continuous random variables, Joint distributions, Independent random variables.

Mathematical Expectation:
Definition, Functions of random variables, some theorems on Expectation, The Variance and Standard Deviation.

UNIT-3 10 Hours

Moments
Covariance, Correlation Coefficient.

Special Probability Distributions:
The Binomial Distribution, The Normal Distribution, The Poisson Distribution, Relations between different distributions, Central limit theorem, Uniform distribution, Chi-square Distribution, Exponential distribution.
UNIT-4 12 Hours

Sampling Theory:

Tests of Hypotheses and Significance:
Estimation theory, Statistical Decisions, Statistical hypotheses, Null hypotheses, Tests of hypotheses and significance, Type I and Type II errors, Level of significance, Tests involving the Normal distribution, One-Tailed and Two-Tailed tests, Special tests of significance for large and small samples, The Chi-square test for goodness of fit.

UNIT-5 10 Hours

Discrete – Parameter Markov Chains:

Text Book:


Reference Books:

Master of Computer Applications

SECOND SEMESTER

Object Oriented Programming with C++ Lab

Subject Code: 13MCA206
CIE Marks : 50

Hours/Week : 04
SEE Marks : 50

Total Hours : 48
SEE Hours : 03

1. Basic Programs.
2. Programs on Classes & Objects.
3. Programs on tokens, expressions & Control Structures.
4. Programs on functions (Inline Functions, Functions Overloading, Returns from Functions)
5. Programs on constructors and destructors.
6. Programs on Arrays, Pointers, Dynamic Allocation Operators.
7. Programs on operator overloading.
8. Programs on inheritance.
9. Programs on pointers, virtual functions and polymorphisms.
11. Programs on file handling.
12. Programs on templates.
Master of Computer Applications
SECOND SEMESTER

Systems Software and Operating System Lab

Subject Code : 13MCA207
CIE Marks :50
Hours/Week : 04
SEE Marks :50
Total Hours : 48
SEE Hours : 03

a) Systems Software Lab Programs

1. LEX and YACC programs
2. Mini Project on : i) Implementation of Assemblers
                   ii) Implementation of Text Editor
                   iii) Implementation of Simple Lexical Analyzer

b) Operating systems Lab Programs

1. Program to Simulate the CPU scheduling algorithms like FCFS, SJF (Preemptive and Non-preemptive), Round-robin scheduling, Priority scheduling. Determine the average waiting time and average turn-around time for these algorithms for the given set of processes.
2. Implement Banker’s algorithm to determine whether the given system of ‘n’ number of processes is in safe state and also implement the Resource request algorithm
3. Simulate the memory management page replacement algorithms like FIFO, Optimal and LRU. Calculate the number of page faults for the given reference string.
4. Program to simulate the disk scheduling algorithms like FCFS, SSTF, SCAN scheduling algorithms for the given requests of the sequence of the blocks on the cylinders. Calculate the total head movement for these algorithms.
Master of Computer Applications  
SECOND SEMESTER  

Data Structures Using C Lab

Subject Code : 13MCA208  
CIE Marks: 50  

Hours/Week : 04  
SEE Marks: 50  

Total Hours : 48  
SEE Hours: 03

1. Develop C programs to demonstrate the operations of stack. (using arrays and structures).

2. Develop C programs to convert the valid infix arithmetic expression to postfix and prefix form. Evaluate postfix expression.

3. Develop recursive C programs.

4. Develop C programs using pointers

5. Develop C programs to simulate the working of simple queue, circular queue and priority queue using arrays and structures.

6. Develop C programs to demonstrate the operations of singly & doubly linked list. (operations like insert a node at the front, at the back, at the specified position; delete a node from the front end, from the back end, from the specified position; search a node, if the info field is specified; display all the nodes in the list).

7. Develop C programs to demonstrate the operations of stack and queues using singly linked list.

8. Develop C programs on binary trees. (Construct a binary search tree and Traverse the tree using all the methods i.e., inorder, preorder, postorder).

9. Develop C programs to demonstrate the different searching techniques over a list of integers. (Linear search, Binary search).

10. Develop C programs to sort a list using different sorting techniques. (Bubble sort selection sort, quick sort, simple insertion sort, shell sort, merge sort, radix sort, Heap sort, Binary tree sort).
Master of Computer Applications

THIRD SEMESTER

Data Base Systems

Subject Code: 13MCA301
Hours/Week: 04
Total Hours: 52

CIE Marks: 50
SEE Marks:50
SEE Hours : 03

UNIT–1

Introduction to Database and Database Architecture
Introduction, Characteristics of Database approach, Actors on the scene, Workers behind the scene, Advantages and Implications of using DBMS approach, Disadvantages of DBMS. Data models, schemas and instances, Three-schema architecture and data Independence, Database languages and interfaces, The database system Environment, Classification of Database Management systems.

Entity-Relationship Model

UNIT–2

Relational Model and Relational Algebra

UNIT–3

SQL- The Relational Database Standard
SQL Data Definition and Data Types, Specifying basic constraints in SQL statements in SQL, Basic queries in SQL, More complex SQL Queries. Views (Virtual Tables) in SQL.
UNIT–4 10 Hours

Database Design
Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form. Properties of Relational Decompositions, Other Dependencies and Normal Forms.

UNIT–5 12 Hours

PL/SQL

Oracle Transactions and Concurrency control.
Locks, Cursors, Error handling. Stored procedures, Stored functions, Database Triggers.

Text Books:

Reference Books:
Master of Computer Applications

THIRD SEMESTER

.NET FRAMEWORK AND C#

Subject Code: 13MCA302
CIE Marks: 50
Hours/Week: 04
SEE Marks: 50
Total Hours: 52
SEE Hours: 03

UNIT 1

Getting started with .NET Framework 4.0


Introducing C#

Need of C#, C# Pre-processor Directives, Creating a Simple C# Console Application, Identifiers and Keywords. Data Types, Variables and Constants: Value Types, Reference Types, Type Conversions, Boxing and Unboxing, Variables and Constants. Expression and Operators: Operator Precedence, Using the ?? (Null Coalescing)Operator, Using the :: (Scope Resolution) Operator and Using the is and as Operators. Control Flow statements: Selection Statements, Iteration Statements and Jump Statements.

UNIT 2

Classes, Objects and Structures

Classes and Objects: Creating a Class, Creating an Object, Using this Keyword, Creating an Array of Objects, Using the Nested Classes, Defining Partial Classes and methods, Static Classes and Static Class Members, Structures: Syntax of a struct and Access Modifiers for structs, Enumerations

Arrays and Strings: Arrays, Multidimensional arrays, jagged arrays, Assigning array references, Foreach loop, Strings

Methods: Controlling access to class members, Pass objects to methods, Using ref and out parameters, Using a variable number of arguments, Returning objects, Method overloading, Constructors, Garbage collection and destructors, Overloading constructors

Properties: Read-only Property, Static Property, Accessibility of accessors and Anonymous types. Indexers
Object-Oriented Programming  05 Hours

Interfaces: Syntax of Interfaces, Implementation of Interfaces, Interfaces and Inheritance.

Unit 3

Delegates, Events and Exception Handling  05 Hours

Delegates: Creating and using Delegates, Multicasting with Delegates.
Events: Event Sources, Event Handlers, Events and Delegates, Multiple Event Handlers.
Exception Handling: System exception class, Exception handling fundamentals, Consequences of an uncaught exception, Using multiple catch statements, Catching all exceptions, Nested try blocks, Throwing an exception, Using finally, Commonly used exceptions, Deriving exception classes, Catching derived class exceptions, Using checked and unchecked.

Namespaces, the Preprocessor and Assemblies:  
03 Hours
Namespaces, Preprocessor, Assemblies and the internal access modifier; Runtime Type ID, Reflection and Attributes: Runtime type definition, Reflection, Using Reflection, Attributes, Using the built-in attributes

Unit 4

Multithreaded Programming:  3 Hours

Multithreading Fundamentals, Thread class, Determining the end of Thread, IsBackground property, Thread priorities, Synchronization, Thread communication using Wait(), Pulse(), PulseAll(), Using MethodImplAttribute, Suspending resuming stopping threads, Determining threads state, Using the Main thread, Starting a separate task

Working with Collections:  2 Hours

Collections overview, Collection interfaces, Dictionary entry structure, General-purpose collection class, Storing bits and BitArray, Specialized collections, Accessing a collection using an enumerator

Building Components:  3 Hours

Introduction to components, Overview of C# component, IComponent, Simple component, Overriding Dispose(), Employing the using statement, Containers
Using I/O: 2Hours

C#’s I/O built in streams, Stream classes, Console I/O, FileStream and Byte-Oriented file I/O, Character based file I/O, Redirecting the standard streams, Reading and writing binary data, Using memory stream, Using StreamReader and StringWriter.

Unit 5

Graphical User Interface with Windows Forms 06 Hours

Introduction, Windows Forms, Event Handling: A Simple Event-Driven GUI, Visual Studio Generated GUI Code, Delegates and Event-Handling Mechanism, Another Way to Create Event Handlers, Locating Event Information, Control Properties and Layout, Labels, TextBoxes and Buttons, GroupBoxes and Panels, CheckBoxes and RadioButtons, ToolTips, Mouse-Event Handling, Keyboard-Event Handling, Menus, MonthCalendar Control, Date TimePicker Control, LinkLabel Control, ListBox Control, CheckedListBox Control, ComboBox Control, TreeView Control, ListView Control, TabControl Control and Multiple Document Interface (MDI) Windows.

Data Access with ADO.NET 06 Hours

Understanding ADO.NET: Describing the Architecture of ADO.NET, ADO.NET Entity Framework, Creating Connection Strings: Syntax for Connection Strings, Creating a Connection to a Database: SQL Server Database, OLEDB Database, ODBC Data Source, Creating a Command Object, Working with DataAdapters: Creating a DataSet from DataAdapter, Paging with DataAdapters, Updating with DataAdapters, Adding Multiple Tables to a DataSet, Creating DataView, Using DataReader to Work with Databases.

Text Books:
1. .NET 4.0 Programming (6-in-1), Black Book, Kogent Learning Solutions Inc., Wiely-Dream Tech Press. (Chapters: 1,10,11,12,13,14 and 19).

References Books:
2. Bart De Smet: C# 4.0 Unleashed, Pearson Education- SAMS Series.
Master of Computer Applications
THIRD SEMESTER
Core Java Programming

Subject Code: 13MCA303

CIE Marks : 50

Hours/Week: 04

SEE Marks : 50

Total Hours : 52

SEE Hours : 03

UNIT-1

10 Hours

Introduction to JAVA and Classes
Introduction: Why Java is important to the internet; Java bytecode. An overview of Java: Object oriented programming: A simple program; Lexical issues. Data types, Variables and arrays: The Simple types; Integers; Floating-Point types; Characters; Booleans; Variables; Type conversion and casting; Arrays. Operators: Arithmetic operators; Relational operators; Boolean logical operators; Assignment operators; The ? operator; Operator precedence. Control statements: Java’s selection statements; Iteration statements; Jump statements.

Introducing classes: Class fundamentals; Declaring objects; Assigning object reference variables; Introducing methods; Constructors; The this keyword; Garbage collection; finalize() method. Closer look at methods and classes: Overloading methods; Using objects as parameters; Returning objects; Recursion; Introducing access control; Understanding static; Introducing final; Introducing nested and inner classes; Exploring String class; Using command-line arguments.

UNIT-2

10 Hours

Strings, Inheritance, Packages
String handling: String constructors; String length; String operations; Character extraction; String comparison; Searching strings; Modifying string; Data conversion using valueOf(); StringBuffer.

Inheritance: Inheritance basics; Using super; Creating a multilevel hierarchy; Method overriding; Dynamic method dispatch; Using Abstract class; Using final with inheritance; The Object class.

Packages and interfaces: Packages; Access protection; Importing packages; Interfaces.
UNIT-3 12 Hours

Exceptions, Multithreaded Programming
Exception handling: Exception-handling fundamentals; Exception types; Uncaught exceptions; Using try and catch; Multiple catch clauses; Nested try statements; throw; throws; finally; Java’s built-in exceptions; Creating your own exception subclasses; Using Exceptions.

Multithreaded programming: Java Thread model; Main thread; Creating a thread; Creating multiple threads; Using isAlive() and join(); Thread priorities; Synchronization; Interthread communication; Suspending, resuming and stopping threads.

UNIT-4 12 Hours

Input/Output
Input/Output: I/O basics; Reading console input; Writing console output; PrintWriter class; Reading and writing files; Transient and volatile modifiers. File; Stream classes; Byte Streams (InputStream; OutputStream; FileInputStream; FileOutputStream; RandomAccessFile; PrintStream); Character streams(Reader; Writer; FileReader; FileWriter; BufferedReader; BufferedWriter; PrintStream); Serialization: Serializable, ObjectOutputStream, ObjectInputStream.

Applet Class: Applet basics; Applet architecture; Applet skeleton; Simple Applet display methods; Requesting repainting; HTML APPLET tag; getDocumentBase() and getCodeBase().

Event Handling: Two event handling mechanisms; Delegation event model; Event classes; Sources of events; EventListener interfaces; Using the Delegation Event Model; Adapter classes; Inner classes

UNIT-5 10 Hours

Applet, Event Handling, AWT
Introducing the AWT: AWT Classes; Window fundamentals; Working with Frame windows; Creating a windowed program; Working with Graphics. Using AWT Controls, Layout managers and menus: Control fundamentals; Labels; Using Buttons; Applying Check Boxes; CheckboxGroup; Choice controls; Using Lists; Using a TextField; Using a TextArea; Understanding layout managers: FlowLayout, BorderLayout, GridLayout; MenuBars and Menus.

Text Book :


Reference Books :

Master of Computer Applications

THIRD SEMESTER

Management Information Systems

Subject Code : 13MCA304
Hours/Week : 04
Total Hours : 52

CIE Marks : 50
SEE Marks : 50
SEE Hours : 03

UNIT-1 10 Hours

Systems Engineering
System concepts, System control, Types of systems, Handling system complexity, Classes of systems, General model of MIS, Need for system analysis, System analysis for existing system & new requirement, System development model, MIS & system analysis

Information and Knowledge
Information concepts, Classification of information, Methods of data and information collection, Value of information: a quality product, General model of a human as information processor, Knowledge.

Introduction of MIS
MIS: Concept, Definition, Role of the MIS, Impact of MIS, MIS and the user, Management as a control system, MIS support to the management, Management effectiveness and MIS, Organization as system. MIS: organization effectiveness.

UNIT-2 10 Hours

Strategic Management of Business
Concept of corporate planning, Essentiality of strategic planning, Development of the business strategies, Type of strategies, Short-range planning, Tools of planning, MIS: Strategic business planning.

Development of MIS
Development of long range plans of the MIS, Ascertaining the class of information, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, Organization for development of MIS, MIS development process model.
UNIT-3  10 Hours

**Role of ICT / IT Strategies /IT Solutions**

Planning fundamentals (real world cases), Organizational planning, planning for competitive advantage(SWOT Analysis), Business models and planning. Business/IT planning, identifying business/IT strategies, Implementation Challenges, Change management, Developing business systems (real world case), SDLC, prototyping, system development process, implementing business system.

**Business Process Re-Engineering**
Introduction, Business process, Process model of the organization, Value stream model of the organization, What delay the business process, Relevance of information technology, MIS and BPR.

UNIT-4  12 Hours

**Technology of Information Systems**
Introduction, Data processing, Transaction processing, Application processing, information system processing, TQM of information systems, Human factors & user interface, Strategic nature of IT decision, MIS choice of information technology.

**Decision Making and DSS**
Decision making concepts; Decision making process, Decision-making by analytical modeling, Behavioral concepts in decision making, Organizational decision-making, Decision structure, DSS components, Management reporting alternatives.

**Data Resource Management**
Managing data sources, Foundation concepts of data, types of databases, traditional file processing, DBMS approach, Database structure, Database Development.

UNIT-V  10 Hours

**Electronic Business Systems**
Enterprise business system – Introduction, cross-functional enterprises applications, real world case, Functional business system, Introduction, marketing systems, sales force automation, CIM, HRM, online accounting system, Customer relationship management, ERP, Supply chain management (real world cases for the above).

**Client Server Architecture and E-business Technology**
Text Books:


Reference Books:

Master of Computer Applications

THIRD SEMESTER

Software Engineering

Subject Code: 13MCA305
CIE Marks : 50

Hours/Week: 04
SEE Marks : 50

Total Hours: 52
SEE Hours : 03

UNIT-1
10 Hours

Overview

Introduction: FAQ’s about software engineering, Professional and ethical responsibility. Socio-Technical systems: Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems.

Software Processes


UNIT-2
10 Hours

Requirements

Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; Interface specification; the software requirements document. Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management.

UNIT-3
10 Hours

System Models, Project Management

System Models: Context models; Behavioral models; Data models; Object models; Structured methods.
Project Management: Management activities; Project planning; Project scheduling; Risk management.
UNIT-4 12 Hours

Software Design
Architectural Design: Architectural design decisions; System organization; Modular decomposition styles; Control styles. Object-Oriented design: Objects and Object Classes; An Object-Oriented design process; Design evolution.

Development
Rapid Software Development: Agile methods; Extreme programming; Rapid application development. Software Evolution: Program evolution dynamics; Software maintenance; Evolution processes; Legacy system evolution.

UNIT-5 10 Hours

Verification and Validation
Verification and Validation: Planning; Software inspections; Automated static analysis; Verification and formal methods. Software testing: System testing; Component testing; Test case design; Test automation.

Management
Managing People: Selecting staff; Motivating people; Managing people; The People Capability Maturity Model. Software Cost Estimation: Productivity; Estimation techniques; Algorithmic cost modeling, Project duration and staffing.

Text Books:

Reference Books:
Master of Computer Applications

THIRD SEMESTER

Data Base Systems Lab

Subject Code: 13MCA306  
CIE Marks : 50
Hours/Week : 04  
SEE Marks : 50
Total Hours : 48  
SEE Hours : 03

1. Exercise on creating tables.
2. Exercise on altering tables, dropping tables.
3. Exercise on giving table level constraints, field level constraints.
4. Exercise on insertion, retrieval, deletion and modification of data values.
5. Exercise on ORDER BY, GROUP BY, HAVING clauses.
6. Exercise on Aggregate functions in SQL.
7. Exercise on Joins, Unions, Sub queries, Nested Sub queries.
8. Exercise on creating views, dropping views.
10. Exercise on PL/SQL : Cursors, Triggers, Exception handling.
11. Design & Implementation of a Database.
Master of Computer Applications

THIRD SEMESTER

.Net Framework and C# Lab

Subject Code: 13MCA307                          CIE Marks: 50
Hours/Week: 04                                   SEE Marks: 50
Total Hours: 48                                  SEE Hours : 03

1. Implementation of flow control and iteration using C#
2. Implementation of Arrays using C#
3. Programs to implement Collection objects.
4. Implementation of Object Oriented Programming using C#.
5. Handling Exceptions.
6. Programs to handle files in C#.
7. Programs to implement thread and multithreading concepts.
8. Network programming using C#
9. Creating Form-Based Windows Applications
10. Programs to connect to backend databases using ADO.Net
Master of Computer Applications

THIRD SEMESTER

Core Java Programming Lab

Subject Code: 13MCA308
CIE Marks : 50
Hours/Week : 04
SEE Marks : 50
Total Hours : 48
SEE Hours : 03

1. Implementation of Arrays using Java
2. Programs to implement Collection objects.
4. Handling Exceptions.
5. Programs to handle files in Java.
6. Programs to implement thread and multithreading concepts.
7. Implementation of AWT components
8. Implementation of Applet
Master of Computer Applications

FOURTH SEMESTER

Enterprise Java

Subject Code: 13MCA401
CIE Marks : 50

Hours/Week : 04
SEE Marks: 50

Total Hours : 52
SEE Hours : 03

UNIT-1

10 Hours

Networking
Networking basics: Java and the net; InetAddress; TCP/IP client sockets; URL: URLConnection; TCP/IP server sockets; Datagrams.

RMI
Remote Method Invocation (RMI): Remote Method Invocation concept; Server side; Client side.

UNIT-2

12 Hours

Swings, JDBC
Swings: JApplet; Icons and Labels; Text fields; Buttons; Check boxes; Combo boxes; Tabbed panes; Scroll panes; Trees; Tables.
JDBC objects: Concept of JDBC; JDBC driver types; JDBC packages; Brief overview of the JDBC process; Database connection; Associating the JDBC/ODBC bridge with the database; Statement objects; ResultSet; Transaction Processing; Metadata; Data types; Exceptions.

UNIT-3

08 Hours

Java Beans
Introduction to Java Beans; Advantages of Java Beans; Bean Developer Kit (BDK); JAR files; Introspection; Developing a simple Bean; Using bound properties; Using BeanInfo Interface; Constrained properties.

UNIT-4

10 Hours

Server Sided Programming
Servlets: Background; Life cycle of a Servlet; Using Tomcat for Servlet development; Simple Servlet; Servlet API; javax.servlet package; Reading Servlet parameter; javax.servlet.http package; Handling HTTP requests and responses; Using Cookies. Java Server Pages (JSP): JSP; JSP tags; Tomcat; Request string; User sessions; Cookies; Session objects.
UNIT-5  12 Hours

**Enterprise Java Beans**
Enterprise Java Beans; Deployment Descriptors; Session Java Bean; Entity Java Bean; Message-Driven Bean; The JAR File.

**Java 2 Platform, Micro Edition ( J2ME )**
Commands, Items, and Event Processing: J2ME User Interfaces., Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling.

High-Level Display: Screens: Screen Class, Alert Class, Form Class, Item Class, List Class, TextBox Class, Ticker Class.

**Text Books :**

**Reference Books :**
1. Dr. Donald Doherty and Rick Leinecker : JavaBeans Unleashed
2. James Goodwill : Developing Java Servlets
3. Karl Avedal, Danny Ayers : Professional JSP
4. Steven Holzner : Java 2 Black Book
5. Ed Roman : Mastering Enterprise JavaBeans
6. Jonathan Knudsen (Author), Sing Li: Beginning J2ME Platform: From Novice to Professional
8. Kim Topley: J2ME in a Nutshell (O'Reilly Java)
Master of Computer Applications
FOURTH SEMESTER
Data Communication and Computer Networks

Subject Code: 13MCA402
CIE Marks : 50
Hours/Week : 04
SEE Marks : 50
Total Hours : 52
SEE Hours : 03

UNIT-I
8 Hours

Introduction


Data Transmission and Transmission Media


UNIT-2
12 Hours

Data Encoding and Communication Interfaces

Digital Data Digital Signals: None turn to zero(NRZ), Multilevel Binary, Biphase, Modulation Rate, Scrambling Techniques; Digital Data Analog Signals: Encoding Techniques; Analog Data Digital Signals: Pulse Code Modulation, Delta Modulation; Asynchronous & Synchronous Transmission; Types of Errors; Error Detection: Parity Check, Cyclic Redundancy Check(CRC); Error Correction: Block Code Principles.

Data Link Control

UNIT-3 10 Hours

LANs and Medium Access Control Protocols

Multiple Access Communications; Local Area Networks; Ethernet and IEEE 802.3 LAN Standard; Token Ring and IEEE 802.5 LAN Standard; FDDI.

Network layer

Network layer design issues: Store and Forward packet Switching, Services Provided to the Transport Layer, Implementation of Connection less Service, Implementation of Connection-Oriented Service, Comparison of Virtual Circuit and Datagram Subnets; Routing algorithms: The Optimality Principal, Shortest Path Routing, Flooding, Distance Vector Routing, Link state Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts;

UNIT-4 10 Hours


UNIT-5 12 Hours

The Transport Layer, Application Layer


Application Layer: DNS- The Domain Name System: The DNS Name Space, Resource Records, Name Servers.
Text Book

   Chapters: 1.2, 2.1-2.4, 3, 4.1, 4.2, 5.1-5.3, 6.1-6.4, 7, 8, 9.1 – 9.3, 10.1 – 10.3, 10.5 – 10.7,

   Chapters: 6.1, 6.2, 6.6.1 – 6.6.3, 6.7.1, 6.7.2

   (Chapters: 1.1 - 1.3.3, 1.3.5, 5.1 (except 5.2.10, 5.2.11), 5.3, 5.4 (except 5.4.5), 5.5, 5.6, 6.1 (except 6.1.4), 6.2, 6.4 - 6.5 (except 6.5.7, 6.5.8, 6.5.10, 6.5.11, 6.5.12), 7.1, 8.1-8.1.3, 8.3.1

Reference Books

Master of Computer Applications

FOURTH SEMESTER

Web Programming

Subject Code : 13MCA403
CIE Marks : 50

Hours/Week : 04
SEE Marks : 50

Total Hours : 52
SEE Hours : 03

UNIT-1
12 Hours

Fundamentals of Web, XHTML, CSS

UNIT-2
8 Hours

JavaScript

UNIT-3
8 Hours

JavaScript and HTML Documents, Dynamic Documents with JavaScript
Introduction to dynamic documents, Positioning Element, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements.

UNIT-4
12 Hours

XML
Perl, CGI Programming
Origins and uses of Perl, Scalar and their operations, Assignment statements and simple input and output, Control Statements, Fundamentals of Arrays, Hashes, References, Functions, Pattern Matching, File Input and Output; Examples, The Common Gateway Interface, CGI linkage, Query string format.

UNIT-5  
12 Hours

PHP
Origins and uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations and expressions, Output, Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Files, Cookies, Session tracking, Database Access with PHP and MySQL.

ASP.NET
Introduction to ASP.NET; ASP.NET controls ;Web Services.

Text Book :

Reference Books :
Master of Computer Applications

FOURTH SEMESTER

Software Practice and Testing

Subject Code: 13MCA404  
CIE Marks: 50
Hours/Week: 04  
SEE Marks: 50
Total Hours: 52  
SEE Hours: 03

UNIT-1  
10 Hours

Style
Style: Names, Expressions and Statements, Consistency and Idioms, Function macros, Comments, Interfaces: User interfaces.

Algorithms and Data structures

Performance
Performance: A bottleneck, Timing and profiling, Strategies for speed tuning the code, Space efficiency, Estimation.

UNIT-2  
10 Hours

Portability

Notation
Formatting Data, Regular Expressions, Programmable tools, Interpreters, Compilers and Virtual Machines, Programs that write programs, Using Macros to generate code; Debugging: Debuggers, Good Clues, Easy Bugs, No Clues, Hard Bugs, Last Resorts, Non Reproducible Bugs, Debugging Tools, Other Peoples Bugs.

UNIT-3  
10 Hours

The Six Essentials of Software Testing
Testing Methods
Verification testing: Basic verification methods, Getting leverage on verification, Verifying documents at different phases, Getting the best from verification, Three critical success factors for implementing verification, Recommendations.

UNIT-4 12 Hours

Validation testing: Validation overview, Validation methods, Validation activities, functional testing and Non-functional testing. Recommendation strategy for validation testing; Controlling validation costs: Minimizing the cost performing tests, Minimizing the cost of maintaining the tests, Minimizing validation testware development costs, Recommendations; Testing tasks, deliverables and chronology: Master test planning, Verification testing tasks and deliverables, Validation testing tasks and deliverables, A testing orphan - user manuals, Product release criteria, Summary of IEEE/ANSI test related documents; Software testing tools: Categorizing test tools, tool acquisition.

UNIT-5 10 Hours

Managing Testing Technology
Organizational approaches to testing: Organizing and reorganizing testing, Structural design elements, Approaches to organizing the test function, Selecting the right approach; Current practices, trends, challenges: GUIs :What is new here, Usage testing, Tester to developer ratios, Software measures and practices benchmark study; Getting sustainable gains in place: Getting gains to happen, Getting help, Follow up; Standards relevant to software engineering and testing. Measurement: Useful and other interesting measures, Recommendations.

Text Books :

Reference Books :
Master of Computer Applications

FOURTH SEMESTER

Communication Skills and Personality Development

Subject Code: 13MCA405
CIE Marks : 50

Hours/Week: 02
SEE Marks : 50

Total Hours : 26
SEE Hours : 03

UNIT-1

5 Hours

- **Personality:**
  Dimensions of personality - Term personality– Significance, factors affecting attitudes, Types of personalities, Develop personality.

- **Communication Types & Styles:**
  **Non-Verbal Communication:** Body Language, Cultural Conventions, Intercultural communication
  **Verbal Communication:** Oral, Written, Oral Elements of Punctuation, Seven Cs of Communication, Importance of Oral Communication in Business, Professional Communication in social contexts(introducing, thanking, hosting, apologizing)

UNIT-2

5 Hours

- **Leadership**
  Who is a leader, what does it mean to be a leader, leadership, leadership in a corporate & society, qualities of a successful leader, team work, character building, decision making skills, difference between leader & manager.

- **Good manners and etiquettes**
  Why do professionals need to learn etiquettes?, Significance of Cross Culture understanding and skills, Cultural Sensitivity, work place etiquettes.

- **Business Communication at Work Place**-
  Memorandum, Meeting, Brochure, Taking notes(essential components), minutes, reports.

UNIT-3

4 Hours

- **Interviews:**
  Types of interviews, resume/c.v, writing, related useful words, preparing for interviews, difference between conversations & other speech events.
• Emotional Intelligence at Work
  Multiple Intelligence, Emotional Intelligence and empathy, Emotional Intelligence to enhance personal and managerial effectiveness

UNIT-4  4 Hours

• Communicative Grammar:
  Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions, Tenses, Active & Passive voice.

• Vocabulary development
  Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

• Comprehension Skills: Reading Comprehension & Listening Comprehension

UNIT-5  5 Hours

• Telephone Techniques
  Warm–up, stages of telephone conversations, commonly used phrases, conference calls, leaving messages, pronunciation, giving information, receiving calls, placing calls, telephone etiquettes.

• Effective Presentation
  Draft of presentations, Audio–Video Aids—the importance of visual aids in presentation, different forms of presentation, the techniques of presentation (body language).

Topics prescribed for labs/ workshops  3 Hours

Group discussion, Mock interview, Public speech, written communication, Listening skills, Presentation skills, Extempore, Debate, Reading list.

Recommended Books:

3. Siman Howard: Creating a Successful CV
5. Dr. SV. Kadvekar, Prin. Dr. C.N. Rawal and Prof Ravindra Kothavade: Business Communication –, Diamond Publications, Pune.
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FOURTH SEMESTER

Enterprise Resource Planning
(Elective Group -1)

Subject Code: 13MCA411
CIE Marks : 50
Hours/Week: 04
SEE Marks: 50
Total Hours: 52
SEE Hours : 03

UNIT I
INTRODUCTION TO ERP
09 Hours
Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering, Data Warehousing, Data Mining, On-line Analytical Processing, Supply Chain Management.

UNIT II
ERP IMPLEMENTATION
12 Hours

UNIT III
BUSINESS MODULES
10 Hours

UNIT IV
ERP MARKET
10 Hours

UNIT V
ERP – PRESENT AND FUTURE
11 Hours
Turbo Charge the ERP System , EIA, ERP and E-Commerce , ERP and Internet, Future Directions in ERP.
Text Books


Reference Books

Master of Computer Applications

FOURTH SEMESTER

SUPPLY CHAIN MANAGEMENT
( Elective Group -I )

Subject Code: 13MCA412
Hours/Week : 04
Total Hours : 52

CIE Marks : 50
SEE Marks: 50
SEE Hours : 03

UNIT-1

10 Hours

Introduction to Supply Chain, Performance of Supply Chain

What is a Supply Chain; Decision phases in a supply Chain; Process view of a Supply Chain; The importance of Supply Chain Flows; Examples of Supply Chains. Competitive and Supply Chain strategies; Achieving strategic fit; Expanding strategic scope.

Supply Chain drivers and Obstacles, Designing Distribution Network
Drivers of Supply Chain Performance; A framework for structuring drivers; Facilities, Inventory, Transportation, and Information; Obstacles to achieve strategic fit; The role of distribution in the Supply Chain; factors influencing distribution network design; Design options for a distribution network; the value of distributors in the Supply Chain; Distribution Networks in practice.

UNIT-2

10 Hours

Network Design
The role of network design in the Supply Chain; Factors influencing Network design Decisions; A framework for Network Design Decisions; Models for facility Location and Capacity Allocation; making Network Design decisions in practice. The impact of uncertainty on Network design; Discounted cash flow analysis; Representations of uncertainty; Evaluating Network Design decisions using Decision Trees; Making Supply Chain decisions under uncertainty in practice.

Demand Forecasting.
The role of forecasting in a Supply Chain; Characteristics of forecast; Components of a forecast and forecasting methods; Basic approach of Demand forecasting; Time series forecasting methods; Measures of forecast errors.
UNIT-3  10 Hours

Aggregate Planning
The role of aggregate planning in a supply Chain; The aggregate planning problem
Aggregate planning strategies.

Inventory Management.
The role of cycle inventory in a supply Chain; Economies of scale to exploit fixed costs,
quantity discounts; Short-term discounting; Managing multi-echelon cycle inventory;
Estimating cycle inventory related costs in practice.

UNIT-4  10 Hours

Transportation
The role of transportation in the Supply Chain; Factors affecting transportation decisions;
Modes of transportation and their performance characteristics; Design options for a
transportation network; Trade-offs in transportation design; Tailored transportation;
Routing and scheduling in transportation; Making transportation decisions in practice.

Pricing and Revenue Management, Coordination
The role of revenue management in Supply Chain; revenue management for multiple
customer segments, perishable assets, seasonal demand, and bulk and spot contracts;
Using revenue management in practice.

UNIT-5  12 Hours

Lack of Supply Chain coordination
Lack of Supply Chain coordination and Bullwhip effect; Effect of lack of coordination on
performance; Obstacles to coordination in the Supply Chain; managerial levers to achieve
coordination; Building strategic partnerships and trust within a supply Chain; Achieving
coordination in practice.

IT, Internet and Supply Chain
The role of IT in the Supply Chain; The Supply Chain IT framework; CRM; Internal
SCM; Supplier Relationship Management; The transaction management foundation; The
future if IT in SCM; Supply Chain It in practice. The role of E-Business in Supply Chain;
The E-Business framework; The B2B addition to the E-Business

Text Books:
1. Sunil Chopra, Pter Meindl: Supply Chain Management Strategy, Planning, and

Reference Books:
2. R.P. Mohanty, S.G. Deshmukh: Supply Chain Management Theories & Practices,
   Bizmantra, 2005.
   Education, 1998
Master of Computer Applications

FOURTH SEMESTER

Mobile Computing and Wireless Communications
(Elective Group -1 )

Subject Code: 13MCA413
CIE Marks : 50

Hours/Week: 04
SEE Marks : 50

Total Hours : 52
SEE Hours : 03

UNIT-1

11 Hours

Mobile Computing Architecture:


Wireless Networks – 1

GSM and SMS, Global Systems for Mobile Communication ( GSM and Short Service Messages ( SMS): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM. Mobility Management.

UNIT-2

10 Hours

Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications.

Wireless Networks – 2: GPRS

GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS.

Wireless Networks – 3: IS – 95, Bluetooth, 3G, WiMAX

IS-95, CDMA versus GSM, Third Generation, Networks and Applications, Introduction to WiMAX and Bluetooth.

UNIT-3

10 Hours

Mobile Client

Building Smart Client Applications: Smart Client Architecture, The Client: User Interface, Data Storage, Performance, Data Synchronization, Messaging. The Server: Data Synchronization, Enterprise Data Source, Messaging.

Building, Mobile Internet Applications

Thin client: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP) Overview.

UNIT-4 09 Hours

Security Issues in Mobile Computing


UNIT-5 12 Hours

Android Application Development

Introduction, Android execution environments, Components, activities, services and intent, setting up Android development environment, debugging Android applications, ApiDemos applications.

Programming Topics

Persistent Data storages, SQLite databases and content providers location based services Android User interface layout basic views, Ticker views, List view, example: simple Phone call

Text Books:


Reference Books:

Master of Computer Applications

FOURTH SEMESTER

Client/Server Computing
( Elective Group -1)

Subject Code: 13MCA414  CIE Marks: 50
Hours/Week : 04  SEE Marks: 50
Total Hours : 52  SEE Hours: 03

UNIT-1  10 Hours

CLIENT/SERVER COMPUTING

Client/Server; File servers; Database servers; Transaction servers; Groupware servers; Object Application servers; Web Application servers; Fat servers or Fat clients; Two tiered architecture; stored procedure; Three tiered architecture ;Client/Server building blocks; Advantages of Client/Server computing.

UNIT-2  10 Hours

COMPONENTS OF CLIENT/SERVER APPLICATIONS

Role of the Client; Client Services; Request for service: Remote Procedure Call, Print Services, Remote Services, Utility services, Message services, Network services, Application services, Database Services. Dynamic Data Exchange(DDE); Object Linking and Embedding; Common Object Request Broker Architecture; Client tools - Non GUI; GUI; Object Oriented User Interface Clients(OOUI)

UNIT-3  09 Hours

Server functionality: request processing, file services, database services, communication services, security services. Network operating system; Server operating system.

CLIENT/SERVER TRANSACTION PROCESSING

ACID Properties; Transaction models – Flat Transactions, Chained and Nested Transactions, TP Monitors.
UNIT-4  
13 Hours

CONNECTIVITY

Open Systems Interconnect; Communications Interface Technology; Inter Process Communication; Wide Area Network Technologies; Network Management.

CLIENT/SERVER AND THE INTERNET

Client/Server ; Web Style; General Structure of HTML Documents; HTTP.

UNIT-5  
10 Hours

CLIENT/SERVER WITH DISTRIBUTED OBJECTS

Distributed Objects and Components, CORBA.

Text Books


Reference Books

2. Subhash Chandra and Yadav Sanjay Kumar : An Introduction to Client Server.
1. Network programming using Sockets and Datagrams
3. Implementation of RMI
4. Implementation of Swing components
5. Programs to connect to backend databases using JDBC
6. Component development using BDK
7. Development of Server sided programs using servlets
8. Developing Java Server Pages
9. Implementation of Session beans
10. Implementation of Entity beans.
11. Developing simple J2ME application
Master of Computer Applications

FOURTH SEMESTER

Data Communication and Computer Networks Lab

Subject Code: 13MCA408
Hours/Week: 04
Total Hours: 48

Use C/C++ for implementation

1. Implementation of error detection mechanisms
2. Implementation of the congestion control algorithms.
3. Implementation of routing algorithms.
4. Implementation of client / server programs using TCP and UDP.
6. Implementation of frame sorting logic, to order frames received from multiple senders.
7. Implementation of TELNET.
8. Simulation of Networking components using any Network Simulation software
9. Use of Open NMS tool.
Master of Computer Applications

FOURTH SEMESTER

Web Programming Lab

Subject Code : 13MCA409
CIE Marks: 50

Hours/Week : 04
SEE Marks : 50

Total Hours : 48
SEE Hours: 03

1. Develop and demonstrate XHTML document that illustrate the use of images, tables, links, formatting tools, lists, forms, frames and style sheets.

2. Develop and demonstrate XHTML document that includes javascript for the following:
   a) Pattern matching
   b) Arrays
   c) Objects
   d) Functions
   e) Control statements
   f) I/O statements
   g) Constructors
   h) Event Handling through...
   Body elements
   Button elements
   Text box and password elements
   i) Element accessing, positioning and moving
   j) Stacking and slow movements to elements
   k) Dragging and dropping the elements
   l) Element visibility

3. Develop and Demonstrate XHTML document that includes javascript for Pattern Matching Using Regular Expressions;

4. Design a XML document to store information and display the XML document.

5. Develop and demonstrate ASP.NET Programs based on HTML Controls, WebControls

6. Simple programs using PERL

7. Execute simple programs using PHP

8. Create a Web Application using PHP

9. Database programs using PHP
Master of Computer Applications
FIFTH SEMESTER
Object Oriented Analysis and Design

Subject Code : 13MCA501
CIE Marks : 50
Hours/Week : 04
SEE Marks : 50
Total Hrs : 52
SEE Hours : 03

UNIT –1
10 Hours

An Overview of Object Oriented Systems Development
Introduction; Why an Object Orientation?; Overview of the Unified Approach.

Object basics
Introduction; An Object-Oriented Philosophy; Objects; Objects grouped in Classes; Attributes; Object Behavior and Methods; Objects respond to Messages; Encapsulation and Information Hiding; Class Hierarchy; Polymorphism; Object Relationships and Associations; Aggregations and Object Containment; Case study-Payroll Program; Advanced Topics.

Object-Oriented Systems Development Life Cycle
Introduction; The software Development Process; Building High-quality Software; Object Oriented Systems Development- a use-case driven Approach; Reusability.

UNIT-2
10 Hours

Object Oriented Methodologies
Introduction; Survey of some of the Object Oriented Methodologies; Rumbaugh's Object Modeling Technique; Booch Methodology; Jacobson Methodologies; Patterns; Frameworks; Unified approach.

Unified Modeling Language
Introduction; Static and Dynamic Models; Why Modeling; Introduction to the Unified Modeling Language; UML Diagrams; UML Class Diagrams; Use-case Diagram; UML Dynamic Modeling; Model Management; UML extensibility; UML Meta-Model.

UNIT-3
12 Hours

Object Oriented Analysis Process
Introduction; Business Object Analysis; Use-Case driven Object-Oriented Analysis; Business Process Modeling; Use-case Model; Developing Effective Documentation; Case study-Analyzing ViaNet Bank ATM.
Object Analysis-Classification
Introduction; Classifications Theory; Approaches for Identifying Classes; Noun Phrase Approach; Common Class Patterns Approach; Use-case driven approach for identifying Classes and their Behaviors through Sequence / Collaboration Modeling; Classes, Responsibilities and Collaborators; Naming Classes.

Identifying Object Relationships, Attributes and Methods
Introduction; Associations; Super-sub class Relationships; A-Part-of Relationships-Aggregation; Case Study-Relationship Analysis for ViaNet Bank ATM; Class responsibility: Identifying Attributes and Methods; Class responsibility: Defining Attributes by analyzing Use Cases and other UML Diagrams; Defining Attributes for Via Net bank Objects; Object Responsibility: Methods and Messages; Defining Methods for Via Net Bank Objects.

UNIT-4 10 Hours

Object-Oriented Design Process and Design Axioms:
Introduction; Object-Oriented Design Process; Object Oriented Design Axioms; Corollaries; Design Patterns.

Designing Classes
Introduction; Object-Oriented Design Philosophy; UML Object Constraint Language; Designing Classes: The Process; Class visibility: Designing well-defined Public, Private and Protected Protocols; Designing Classes: Refining Attributes; Refining Attributes for the Via Net bank Objects; Designing Methods and Protocols; Designing Methods for the Via Net Bank Objects; Packages and Managing Classes.

UNIT-5 10 Hours

Access Layer: Object Storage and Object Interoperability
Introduction; Object Store and Persistence: An Overview; Database Management Systems; Logical and Physical Database Organization and Access Control; Distributed Databases and Client-server Computing; Distributed Objects Computing; Object-Oriented Database Management Systems; Object-Relational Systems; Multidatabase Systems; Designing access layer Classes; Case study - designing the access layer for the Via Net bank ATM.

View Layer: Designing Interface Objects
Introduction; User Interface Design as a Creative Process; Designing View Layer Classes; Macro Level Process: Identifying View Classes by Analyzing Use Cases; Micro-level Process; The purpose of a View Layer Interface; Prototyping the User Interface; Case study-Designing User Interface for ViaNet Bank ATM.
Text Book:


Reference Books:

1. Rebecca Wirfs: Designing Object-Oriented Software, Prentice-Hall India.
Master of Computer Applications
FIFTH SEMESTER
WEB 2.0 AND RICH INTERNET APPLICATIONS

Subject Code: 13MCA502
CIE Marks: 50
Hours/Week: 04
SEE Marks: 50
Total Hours: 52
SEE Hours: 03

UNIT-1
08 Hours

Introduction, Web Services
What is Web 2.0?, Folksonomies and Web 2.0, Software As a Service(SaaS), Data and Web 2.0, Convergence, Iterative development, Rich User experience, Multiple Delivery Channels, Social Networking. Web Services: SOAP, RPC Style SOAP, Document style SOAP, WSDL, REST services, JSON format, What is JSON?, Array literals, Object literals, Mixing literals, JSON Syntax, JSON Encoding and Decoding, JSON versus XML.

UNIT-2
12 Hours

Building Rich Internet Applications with AJAX
Building Rich Internet Applications with AJAX: Limitations of Classic Web application model, AJAX principles, Technologies behind AJAX, Examples of usage of AJAX, Dynamic web applications through Hidden frames for both GET and POST methods, IFrames, Asynchronous communication and AJAX application model, XMLHttpRequest Object – properties and methods, handling different browser implementations of XMLHttpRequest, The same origin policy, Cache control, AJAX Patterns (Only algorithms – examples not required): Predictive fetch pattern, Submission throttling pattern, Periodic refresh, Multi stage download, Fall back patterns.

UNIT-3
12 Hours

Building Rich Internet Applications with Flex
Flash player, Flex framework, MXML and Actionscript, Working with Data services, Understanding differences between HTML and Flex applications, Understanding how Flex applications work, Understanding Flex and Flash authoring, MXML language, a simple example. Using Actionscript, MXML and Actionscript correlations. Understanding Actionscript 3.0 language syntax: Language overview, Objects and Classes, Packages and namespaces, Variables & scope of variables, case sensitivity and general syntax rules, Operators, Conditional, Looping, Functions, Nested functions, Functions as Objects, Function scope, OO Programming in Actionscript: Classes, Interfaces, Inheritance, Working with String objects, Working with Arrays, Error handling in Actionscript: Try/Catch, Working with XML.
**Framework fundamentals:** Understanding application life cycle, differentiating between Flash player and Framework, Bootstrapping Flex 66 applications, Loading one flex application in to another, Understanding application domains, Understanding the preloader. Managing layout, Flex layout overview, Working with children, Container types, Layout rules, Padding, Borders and gaps, Nesting containers, Making fluid interfaces.

**UNIT-4**

10 Hours

**Working with UI components:** Understanding UI Components, Creating component instances, Common UI Component properties, Handling events, Button, Value selectors, Text components, List based controls, Data models and Model View Controller, Creating collection objects, Setting the data provider, Using Data grids, Using Tree controls, Working with selected values and items, Pop up controls, Navigators, Control bars. Working with data: Using data models, Using XML, Using Actionscript. classes, Data Binding.

**UNIT-5**

10 Hours

**Building Advanced Web 2.0 applications**
Definition of mash up applications, Mash up Techniques, Building a simple mash up application with AJAX, Remote data communication, strategies for data communication, Simple HTTPServices, URLLoader in Flex, Web Services in Flex, Examples: Building an RSS reader with AJAX, Building an RSS reader with Flex, EXTJ.

Introduction to Silverlight, JavaFX, OpenLazzlo

Developing applications on Smartphones: Study of a few cases like Android systems and developing applications on these platforms. Overview of Force.com platform for developing mobile apps.

**Text Books:**


**Reference Books:**

Master of Computer Applications
FIFTH SEMESTER

Design and Analysis of Algorithms

Subject Code : 13MCA503
CIE Marks : 50
Hours/Week : 04
SEE Marks : 50
Total Hours : 52
SEE Hours : 03

UNIT-1 09 Hours

Introduction
Notion of Algorithm; Fundamentals of Algorithmic Problem Solving; Important Problem types; Fundamental data structures.

Fundamentals of the Analysis of Algorithm Efficiency
Analysis framework; Asymptotic notations and basic efficiency classes; Mathematical Analysis of Recursive and Non-recursive algorithms; Examples.

UNIT-2 11 Hours

Brute Force
Selection Sort and Bubble Sort; Sequential Search and String Matching; Exhaustive Search.

Space and Time Tradeoffs
Sorting by Counting; Input Enhancement in String Matching; Hashing.

Graphs, Graph traversal and their applications
Introduction of Graphs, Application of graphs, Representation of Graph, Traversals methods for undirected graphs, transitive closure, Warshall’s algorithm, Shortest-path algorithm (Dijkstra’s)

UNIT-3 10 Hours

Divide and Conquer
Merge Sort; Quick Sort; Binary Search; Binary Tree Traversals and related properties; Multiplication of large integers.

Decrease and Conquer
Insertion Sort, Depth First and Breadth First Search; Topological Sorting; Algorithms for Generating Combinatorial Objects.
UNIT-4  12 Hours

Transform and Conquer
Presorting; Balanced Search Trees; Heaps and Heap sort; Problem Reduction

Greedy Technique
Prim’s Algorithm; Krushkal’s Algorithm; Dijkstra’s Algorithm; Huffman trees, Job sequencing with deadline, Knapsack problem.

UNIT-5  10 Hours

Dynamic Programming
Computing Binomial Coefficient; Warshall’s and Floyd’s Algorithms; The Knapsack problem and Memory Functions.

Coping with the Limitations of Algorithm Power
Backtracking; Branch-and-Bound; Approximation algorithm for NP-Hard problems.

Text Books:
2. Yedidyah Langsam and Moshe J. Augenstein and Aaron M Tenanbaum: Data Structures using C and C++ Pearson Education Asia. (Chapter 8)

Reference Books:
Master of Computer Applications

FIFTH SEMESTER

Object Oriented Analysis and Design Lab

Subject Code : 13MCA504
Hours/Week : 04
Total Hours : 48

CIE Marks : 50
SEE Marks : 50
SEE Hours : 03

1. Exercises to identify the requirements of a system via Use Case Diagrams.

2. Exercises to represent the dynamic model of the system using Activity, Statechart and Sequence diagrams.

3. Exercises to represent the static model of the system using class diagrams

4. Exercises to show the deployment of the system using component and deployment diagrams.

5. Use of testing tools.

Note: Implementation of the exercises is done using Java programming language.
Master of Computer Applications

FIFTH SEMESTER

WEB 2.0 AND RICH INTERNET APPLICATIONS Lab

Subject Code : 13MCA505
Hours/Week : 04
Total Hours : 48

CIE Marks: 50
SEE Marks: 50
SEE Hours: 03

Developing web applications to introduce the following concepts

1. Simple programs using JSON.
2. Simple “Hello World” application using AJAX.
3. AJAX applications using various GUI components.
4. Implementation of “Shopping cart” application using AJAX.
5. AJAX application to keep track of user data and retrieve the session data.
6. AJAX application to verify client side and server side data.
7. Application using XMLHttpRequest.
8. Simple Flex applications.
9. Flex applications using actionscript.
10. Web applications that use RPC.
11. Building RESTful Web Services with JAX-RS.
12. Simple SOAP application.
Master of Computer Applications

FIFTH SEMETER

Data Warehousing and Data Mining
(Elective – Group 2)

Subject Code: 13MCA511
CIE Marks : 50
Hours/Week : 04
SEE Marks:  50
Total Hours  : 52
SEE Hours : 03

UNIT-1  
10 Hours

Data Warehousing
Introduction, Operational Data Stores(ODS), Extraction Transformation Loading (ETL), Data Warehouses, Design Issues, Guidelines for Data Warehouse Implementation.

Online Analytical Processing
Introduction, Characteristics of OLAP systems, Multidimensional view and Data cube, Data Cube Implementations, Data Cube Operations.

UNIT-2  
10 Hours

Data Mining
Introduction, Challenges, Data Mining Tasks, Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity: Similarity Measures for binary data, Jaccard Coefficient, and Cosine similarity.

UNIT-3  
10 Hours

Association Analysis: Basic Concepts and Algorithms

UNIT-4  
12 Hours

Classification
UNIT-5  

Clustering Analysis: Basic Concepts and Algorithm


Text Books:


Reference Books:

2. Jiawei Han and Micheline Kamber : Data Mining – Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006  
Master of Computer Applications

FIFTH SEMESTER

Cryptography and Network Security
(Elective – Group 2)

Subject Code: 13MCA512
CIE Marks : 50
Hours/Week : 04
SEE Marks: 50
Total Hours : 52
SEE Hours : 03

UNIT-1
10 Hours

Foundations of Cryptography and Security
Ciphers and Secret Messages, Security Attacks and Services.

Conventional Symmetric Encryption Algorithms
Theory of Block Cipher Design, Feistel Cipher Network Structures, DES and Tripple DES, Modes of Operation (ECB, CBC, OFB, CFB), Strength (or not) of DES.

UNIT-2
12 Hours

Modern Symmetric Encryption Algorithms
Blowfish, Key Distribution.

Public Key Cryptography
Prime Numbers and Testing to Primality, Factoring Large Numbers, RSA, Diffie-Hellman, Key exchange Algorithms.

UNIT-3
10 Hours

Hashes and Message Digest
Message Authentication, MD5

Digital Signatures
Certificates, User Authentication, Digital Signature Standard (DSS and DSA)

UNIT-4
10 Hours

Authentication of Systems
Kerberos V4 and V5, X.509 Authentication Service.

Electronic Mail Security
Pretty Good Privacy (PGP)
IP and Web Security
IP Sec and Virtual Private Networks, Secure Sockets and Transport Layer (SSL and TLS).

UNIT-5 10 Hours

Electronic Commerce Security

Text Book:

Reference Book:
Master of Computer Applications

FIFTH SEMESTER

Advanced Topics in DBMS
(Elective Group -2 )

Subject Code: 13MCA513
CIE Marks : 50
Hours/Week: 04
SEE Marks : 50
Total Hours : 52
SEE Hours : 03

UNIT – 1
08 Hours

Over view of Storage and Indexing, Disks and Files

Data on external storage;File organizations and indexing;Index data structures;Comparison of file organizations;Indexes and performance tuning Memory hierarchy;RAID; Disk space management;Buffer manager;Files of records;Page formats and record formats

UNIT – 2
12 Hours

Tree Structured Indexing

Intuition for tree indexes ;Indexed sequential access method; B+trees, Search, Insert, Delete, Duplicates, B+tress in practice

Hash-Based Indexing

Static hashing,Extendible hashing,Linear hashing,comparisons

UNIT – 3
10 Hours

Overview of Query Evaluation,External Sorting

The system catalog,Introduction to operator evaluation;Algorithm for relational operaions; Introduction to query optimization; Alternative plans; A motivating example; what a typical optimizer does. When does a DBMS sort data? A simple two-way merge sort; External merge sort

UNIT – 4
12 Hours

Evaluating Relational Operators

The Selection operation; General selection conditions; The Projection operation; The Join operation; The Set operations; Aggregate operations; The impact of buffering.
A Typical Relational Query Optimizer

Translating SQL queries into Relational Algebra; Estimating the cost of a plan; Relational algebra equivalences; Enumeration of alternative plans; Nested sub-queries; other approaches to query optimization.

UNIT – 5 10 Hours

Physical Database Design and Tuning

Introduction; Guidelines for index selection, examples; Clustering and indexing; Indexes that enable index-only plans, Tools to assist in index selection; Overview of database tuning; Choices in tuning the conceptual schema; Choices in tuning queries and views; Impact of concurrency; DBMS benchmarking.

Recent Applications

Mobile databases; Multimedia databases; Geographical Information Systems; Genome data management.

Text Books:


Reference Books:

Master of Computer Applications

FIFTH SEMESTER

Parallel Computing
(Elective Group-2)

Subject Code: 13MCA514
CIE Marks : 50
Hours/Week: 04
SEE Marks : 50
Total Hours : 52
SEE Hours : 03

UNIT – 1
10 Hours

SCALABILITY AND CLUSTERING


UNIT – 2
12 Hours

ENABLING TECHNOLOGIES


UNIT – 3
10 Hours

SYSTEM INTERCONNECTS

Basics of Interconnection Networks, Network Topologies and Properties, Buses, Crossbar and Multistage Switches, Software Multithreading, Synchronization Mechanisms.

UNIT – 4
10 Hours

PARALLEL PROGRAMMING

Paradigms And Programmability, Parallel Programming Models, Shared Memory Programming.

UNIT – 5
10 Hours

MESSAGE PASSING PROGRAMMING

Text Book:


Reference Books:

Master of Computer Applications

FIFTH SEMESTER

Cloud Computing
(Elective Group -3)

Subject Code: 13MCA521
CIE Marks : 50
Hours/Week: 04
SEE Marks : 50
Total Hours: 52
SEE Hours : 03

UNIT-1
12 Hours

Distributed System Models and Enabling Technologies


Computer Clusters for scalable parallel computing

Clustering for massive parallelism: Cluster Development Trends, Design Objective of Computer Clusters, Fundamental Cluster Design issues. Virtual machines and Virtualization of clusters and Data centers: Implementation levels of virtualization: levels of virtualization Implementation, VMM Design requirements and providers, Virtualization support at the OS level, Middleware Support for Virtualization.

UNIT-2
12 Hours

Cloud Platform Architecture over Virtualized Data Centers


Public Cloud Platforms

GAE, AWS, and Azure: Public Clouds and Service Offerings, Google App Engine (GAE), Amazon Web Service (AWS), Microsoft Windows Azure. Inter-cloud Resource

UNIT-3 10 Hours

Cloud Programming and Software Environments

Features of Cloud and Grid Platforms: Cloud Capabilities and Platform Features, Traditional Features Common to Grids and Clouds, Data Features and Databases, Programming and Runtime Support. Parallel and Distributed Programming Paradigms: Parallel Computing and Programming Paradigms, MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache.

UNIT-4 10 Hours

Programming Support of Google App Engine

Programming the Google App Engine, Google File System (GFS), Bigtable, Google’s NOSQL system, Chubby, Google’s Distributed Lock service. Programming on Amazon AWS and Microsoft Azure: Programming on Amazon EC2, Amazon Simple Storage Service S3, Amazon Elastic Block Store EBS and SimpleDB, Microsoft Azure programming support. Emerging Cloud Software Environments: Open Source Eucalyptus and Nimbus, OpenNebula, Sector/Sphere, and OpenStack, Manjrasoft Aneka Cloud and Appliances.

UNIT-5 8 Hours

Ubiquitous Clouds and the Internet of Things


Text Book:


Reference Books:

Master of Computer Applications

FIFTH SEMESTER

Computer Graphics
(Encrypt Group -3 )

Subject Code: 13MCA522
CIE Marks : 50
Hours/Week: 04
SEE Marks : 50
Total Hours : 52
SEE Hours : 03

UNIT-1 12 Hours

Introduction


Raster Graphics Algorithms

Scan converting lines – DDA and Bresenham’s line generating algorithms, Scan converting circles – Bresenham’s and midpoint circle generating algorithm, Filling rectangles, Filling Polygons, Antialiasing.

UNIT-2 10 Hours

2D Geometrical Transformations & Viewing

2D Transformations, Homogeneous coordinates and Matrix representation of 2D Transformations, Composition of 2D Transformations, Viewing - Window to Viewport coordinate transformation, Clipping lines, Clipping polygons.

UNIT-3 10 Hours

3D Geometrical Transformations

The Window to Viewport Transformation, Matrix representation of 3D Transformations, Transformations as change in coordinate system.

Projections and Viewing in 3D

Projections specifying an arbitrary 3D view, Examples of 3D viewing.
UNIT-4  

Curves, Fractal and Shading

Polygon surfaces, curved lines and surfaces, Quadratic surfaces, Bezier & BSpline curves & surfaces, Fractal Geometry methods, Illumination models, Shading models for polygons, surface details and shadows.

UNIT-5  

Visible Surface Determination


Text Books


Reference Books

Master of Computer Applications

FIFTH SEMESTER

Building Enterprise Applications
(Elective Group -3)

Subject Code : 13MCA523
CIE Marks : 50
Subject Code : 13MCA523
CIE Marks : 50
Hours/Week : 04
SEE Marks : 50
Total Hours : 52
SEE Hours : 03

UNIT-1 12 Hours

Introduction

Enterprise applications and their types, software engineering methodologies, life cycle of raising an Enterprise application, introduction to skills required to build an Enterprise application, key determinants of successful Enterprise applications, and measuring the success of Enterprise applications

Inception of Enterprise Applications

Enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non-functional requirements, requirements validation, planning and estimation, *Case Study.

UNIT-2 10 Hours

Architecting and Designing Enterprise Applications –part 1
Architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture and design, different technical layers, best practices, *Case Study.

UNIT-3 10 Hours

Architecture and Designing Enterprise Applications –Part 2
Data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design, *Case Study.
UNIT-4  

Construction Enterprise Applications

Defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, +build and testing, dynamic code analysis – code profiling and code coverage, *Case Study.

UNIT-5  

Testing and Rolling Out Enterprise Applications

Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application, *Case Study.

*Case Study Guidelines:-
Students should work in one case study (for Ex: - Telecom order Management System) to implement (and learn to use the tools to accomplish this task) the following (illustrative only)

- Understand a given business scenario and document the use case diagrams for the given scenario
- Identify the non-functional requirements for the given scenario and document it in the given template
- Create a logical architecture for the given business scenario documented in use case diagrams
- Create a data architecture for the given logical architecture
- Create a subset of design for the given logical architecture
- Create test cases (subset) as per the given template
- Code analysis of the given code base (case study)
- Testing the application of the given code base (case study) – Performance and Penetration testing.

By the end of the semester each student should submit one in detailed case study report for 10 Internal Assessment Marks.
Text Books:

1. Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, Veerakumar Esakimuthu: Raising Enterprise Applications – Published by John Wiley, authored by
2. Brett McLaughlin: Building Java Enterprise Applications – Published by O'Reilly Media

Reference Books:

1. Software Requirements: Styles & Techniques – published by Addison-Wesley Professional
Master of Computer Applications

FIFTH SEMESTER
UNIX System Programming
(Elective Group - 3)

Subject Code : 13MCA524
CIE Marks : 50
Hours/Week : 04
SEE Marks : 50
Total Hours : 52
SEE Hours : 03

UNIT-1
10 Hours

Introduction


UNIX Files


UNIT-2
10 Hours

UNIX File APIs

General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs, General File Class, regfile Class for Regular Files, dir file Class for Directory Files, FIFO File Class, Device File Class, Symbolic Link File Class, File Listing Program.

UNIT-3
12 Hours

UNIX Processes

Process Control


UNIT-4 10 Hours

Signals and Daemon Processes Signals:


UNIT-5 10 Hours

Interprocess Communication  -1

Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores.

Interprocess Communication -2


Text Books:


Reference Books:

3. Uresh Vahalia: Unix Internals, Pearson Education , ASIA.