

UNIVERSITY OF PUNE

Syllabus for Master Degree in Computer Management M.C.M.

[M.C.M. Part I From Academic Year 2008-2009,
M.C.M. Part II From Academic Year 2009-2010]

(I) INTRODUCTION

1. The name of the programme shall be Masters' Degree in Computer Management (M.C.M.)
2. The knowledge and skills required to plan, design and build complex application software systems are highly valued in all industry sectors including business, health, education and the services. The basic objective of the Masters' Degree in Computer Management (M.C.M.) is to provide to the country a steady stream of competent young men and women with the necessary knowledge, skills and foundations for acquiring a wide range of rewarding careers into the rapidly expanding world of Information Technology.
3. The Job Opportunities are :
 - a. Many graduates begin their careers as junior programmers and, after some experience, are promoted to senior programmers, systems analysts, programmer/analysts, software testers posts. Others seek entrepreneurial roles in the computer world as independent business owners, software authors, consultants, or suppliers of systems and equipment. Career opportunities exist in such areas as management, software and hardware sales, technical writing, training others on computers, consulting, software development and technical support.
 - b. Application areas include transaction processing (such as order processing, airline, railway reservations, banking systems), accounting functions, sales analysis, games, forecasting, simulation, database management, decision support data communications, and e-commerce.
4.
 - a. The first two semesters of the programme is a mix of computer-related and general business courses. The computer-related courses use computers to introduce standard techniques of programming; the use of software packages systems analysis and design. The general business courses include the functional areas of management like and the study of marketing management, financial management, operations management and general management . The course would emphasize the study and creation of business applications, rather than mere programming. Considering the current environment, fundamental concepts related to web-based applications are introduced.
 - b. In semesters III and IV, students are exposed to system development in the information processing environment, with special emphasis on Management Information Systems and Computer Resource Management.

5. **Duration:** The M.C.M. program will be full-time two years' Master's Degree in Computer Management.
6. The new curriculum would focus on imparting skills, necessary for developing a career in the field of business applications of computer, in emerging global scenario which emphasizes e-business in all sectors of the economy.
7. The institutes should organize placement program for the MCM students, by interacting with the industries and software consultancy houses in and around the region in which the educational institution is located.
8. **Intake:** In each class, not more than 60 students will be admitted.

(II) ELIGIBILITY FOR ADMISSION

Graduates possessing any faculty of any statutory University shall be eligible for admission to the M.C.M. course.

(III) NUMBER OF LECTURES AND PRACTICALS :

Lectures and practicals should be conducted as per the scheme of lectures and practicals.

(IV) PRACTICAL TRAINING AND PROJECT WORK:

Towards the end of the second year of study, a student will be examined in the course "Project Work".

- a. Project Work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to monitor the progress of individual student.
- b. Student should take guidance from an internal guide and prepare a Project report on "Project Work" in 2 copies to be submitted to the Director of the Institute by 31st March. Wherever possible, a separate file containing source-code listings should also be submitted.
- c. The Project Work should be of such a nature that it could prove useful or be relevant from the commercial / management angle.
- d. The project report will be duly assessed by the Internal guide of the subject and marks will be communicated by the Director to the University after receiving the Seat numbers from the University along with marks of the internal credit for theory and practicals to be communicated for all other courses.
- e. The project report should be prepared in a format prescribed by the University which also specifies the contents and the method of presentation.
- f. The project work will carry 80 marks for Internal assessment and 120 marks for external viva. The external viva shall be conducted by a minimum of two external examiners.

- g. Project Work can be carried out in the Institute or outside with prior permission of the Institute.
- h. The external viva-voce examination for Project Work would be held in March/April of the second year of study, by a panel of two external examiners.

(IV) ASSESSMENT

The final total assessment of the candidates is made in terms of an Internal assessment and an external assessment for each course.

For each paper, 30% marks will be based on internal assessment and 70% marks for semester end examination (external assessment), unless otherwise stated.

The division of the 30% marks allotted to internal assessment of theory papers is on the basis of tutorial work and written test of 15 marks, seminars and presentations 10 marks and attendance 5 marks.

The internal marks will be communicated to the University at the end of each semester, but before the semester end examinations. These marks will be considered for the declaration of the results.

(V) EXAMINATION

Examinations shall be conducted at the end of each semester i.e. during April/May and also in October/November.

(VI) STANDARD OF PASSING

- a. Every candidate must secure 40% marks in each head of passing.
- b. The passing marks for external examination will thus be 32 out of 80 and for internal examination 8 out of 20 and aggregate marks taking both together will be 40 marks.
- c. Reassessment of Internal marks :
In case of those students who have secured less than passing percentage of marks in internal i.e. less than 40%, the institute will administer a separate internal test. The results of which may be conveyed to the University as the Revised Internal Marks.
In case the result of the internal test as above, results in lower marks than the original, the original figure of the marks will prevail. In short, the rule is higher of the two figures of the marks.
However, the institute will not administer any internal test, for any subject for those candidates who have already scored 40% or more marks in the internal examination.

(VIII) BACKLOG

Two semesters backlog can be carried to the third semester.

(IX) CLASS

There shall be numerical marking for each question. At the time of declaration of the result, the marks obtained by a candidate are converted into classes as shown below:

The class will be awarded on the basis of aggregate marks scored by the student (i.e. out of 2200), provided he/she has passed in both the internal/external examinations of all the subjects in M.C.M. Part I and Part II.

CLASS	TOTAL MARKS
First Class with Distinction	1540 and above
First Class	1320 to 1539
Higher Second Class	1210 to 1319
Second Class	1100 to 1209
Pass Class	880 to 1099
Fail	879 and below

(X) FEES FOR EACH YEAR

Fees will be as stated below:

Tuition fees	Rs. 25,000
Laboratory fees	Rs.9,000
Other fees	Rs.5,565

(XI) MEDIUM OF INSTRUCTION

The medium of instruction will be English.

(XII) REVISION OF SYLLABUS

As the computer technology is changing very fast, revision of the syllabus should be considered every 3 years.

(XIII) TEACHING AND PRACTICALS SCHEME

Each Session will be of 1 and 1/2 Hrs. (Includes Lecture & Practical)

For a Year : 28 Weeks Teaching , 12 Weeks Vacation , 12 Weeks PPL & Exam

Semester I

Subject Code	Subject Name	Mark	Type	Sessions Lectures
101	C Programming	100	C	40
102	Fundamentals of Information Technology	100	C	40
103	Software Engineering and Business Process	100	C	40
104	PPM and OB	100	C	40
105	Web Programming and E-Commerce	100	C	40
106	Practicals	50	FI	

Semester II

Subject code	Subject Name	Mark	Type	Sessions Lectures
201	Data structure and Algorithms	100	C	40
202	DBMS	100	C	40
203	Oracle	100	C	40
204	Basic Java OR Core Ruby	100	C	40
205	Object Oriented Designing	100	C	40
206	Practicals	50	FI	

Semester III

Subject code	Subject Name	Mark	Type	Sessions Lectures
301	Linux	100	C	40
302	Business Application	100	C	40
303	Advance Java OR Advance Ruby	100	C	40
304	VB.NET	100	C	40
305	Software Project Management	100	C	40
306	Practicals	50	FI	

Semester IV

Subject code	Subject Name	Mark	Type	Sessions Lectures
401	** Mobile Computing	100	C	40
402	**ASP.NET	100	C	40
403	**Information Security	100	C	40
404	**Cyber Law	100	C	40
405	**Multimedia and Web Designing	100	C	40
406	Quality Control and Software Testing	100	C	40
407	Network Technologies	100	C	40
408	Project	100	C	
409	Project	100	C	
410	Practicals	50	FI	

(C) : Compulsory, subject to be evaluated by the University

(FI) : Fully Internal to be evaluated by the Institute.

- Student can choose any **three** subjects(401-408) from the above mentioned Elective which is discreetly offered by the Institute.
- Practical will be included in IT papers
- No separate practical exams will be conducted
- Case studies should be taken for non-IT papers
- In Total 72 hours practical to be taken per semester.

SEMESTER 1

'C' PROGRAMMING – [101]

1) C Fundamentals:

(3)

C Character Set, Identifiers and Keywords under ANSI C. Data Types, Constants: int, float, double, char. Qualifiers: long, short, unsigned and signed. Escape sequences (like \n,\b etc.). Arithmetic Expressions and different built-in Operators. Pre-processor directives (like #include, #define), concept of header files, Symbolic constants, Comments, sizeof., steps involved in translation of C Program. Concept of typedef for renaming a built-in data type.

2) Flow Charts and Decision Table

(2)

Flow Diagram, Flow Chart symbols and their use, System flowcharts, program flowcharts, outline flowcharts, detail flowcharts, flowcharts and signs of communications, flow lines, process decisions, connectors, terminals, flowcharts for simple programs-problems.

Decision tables, condition stub, condition entry, action stub, action entry, decision rule, limited entry decision tables, extended entry decision table, mixed entry decision tables, comparison between flowcharts and decision tables.

3) Built-in operators and functions.

(2)

Console based I/O and related built-in I/O functions: printf(), scanf(); getch(), getchar(), putchar(), gets(), puts().

4) Decision and Case Control Structure

2)

if statement; if-else construct; use of logical operators and Compound Relational Tests; Nested if statements; The else if construct; the relational operators; the conditional expression (ternary) operator. The Switch Statement with or without break, concept of a case label, goto statement, concept of a goto label, comparison between goto and case labels.

5) Loop Control Structure

(2)

Concept of Loop, loops supported by 'C', concept of top tested and bottom tested loops, the for loop statement; Nested for Loop ; for loop variants; the while loop statement; simple and nested while loop, Increment/decrement operators; Use of Break and Continue; the do-while loop, comparison between for, while and do while loops.

6) Storage Classes

(1)

Automatic, Register, Static (local and global), External. Scope rules.

7) Arrays

(4)

Concept of a collection, types of collections supported by 'C', Array collection and its features, concept of indexing, index variable, index type, positional value of a member of array collection, concept of dimension and size of an array, 'C' syntax for declaration of array, name of the array and its type, Referring individual elements, Entering data into an

array, reading data from an array concept of Array initialization and list of initializers, size option, Bounds checking, the concept of two dimension arrays and related syntax, similarities between dimension and nesting.

8) Character Strings

(2)

What are strings, standard library string functions like strlen(),strcat(), strcpy(), strcmp(), similarity between string and 1-D array of char.

9) Functions

(4)

Concept of a subprogram, the interface of a subprogram, role of a interface, Arguments of a subprogram, kinds of subprograms supported by C, return statement as an interface, local variables; Default Return type and the type void; Passing values between functions through interfaces; Declaration of function type; iterative and recursive subprograms, Recursion; concept of call by value, call by reference, return and their underlying implementation should be explained, similarities and differences between Function & Macros, concept of nested macros and their use, recursion as a special nested call.

10) Pointers

(4)

Concept of Pointers, Pointer as an address variable, concept of a pointer data type and its syntax, built-in address operator, Pointers to existing variables of different data types and their uses, use of indirection operator, the name of the array as a pointer variable, Pointers and Arrays, Pointers arithmetic, use of unary operators (++ , --), One Dimension Arrays and Pointer, concept of array of pointers and simple use, command line arguments for the main, pointer as a return type of a function.

11) Structures

(3)

Structure as a homogeneous and heterogeneous collection, possible applications, syntax of declaring structure, Initializing structures, structure variables, accessing structure elements using member operator, Arrays of Structures, and array as member of structure, conceptual difference between array and structure collection, Functions and Structures, nested structures, concept of anonymous structures and their use, Concept of self referential structure, pointer as member of structure and pointer to structure use of member selector operator(->), comparison between indirection (*) operator and member selector operator (->), structure as an argument to function and return type of a function.

12) Unions

(2)

Concept of Union collection, Syntax of declaration and its use, comparison of Array, Structure and Union, array of unions and union as a member of structure, structure as a member of union and array as member of union, concept of memory saving and union, union as a generic data type, concept of anonymous union.

13) Console based I/O

(2)

use of console as a file environment, use of keyboard and VDU as I/O files: Use of stdin, stdout, stderr and stderr as built-in file pointers for console environment, use of printf(), scanf() as fprintf() and fscanf(), use of fflush().

14) File based I/O**(3)**

Concept of a file, text files in 'C', concept of a predefined FILE pointer and its definition as given in header file stdio.h, meanings of different members of the structure representing FILE, Disk I/O Functions: High level file I/O or standard functions- fopen(), putc(), getc(), fclose(), fgets(),fputs(),feof(), simple file based programs showing the working of different members of FILE structure.

15) Dynamic Memory Allocation and Memory functions**(1)**

Concept of dynamic environment as run time environment, concept of dynamic memory management, use of built-in dynamic memory management tools of 'C' viz. malloc(), free(), simple programs using malloc() and free()

16) Bitwise Operator**(2)**

Concept of modifying the value using bit shifting, built-in bit shift operators left bit shift operator(<<) and right bit shift operator (>>) their uses, limitations of bitwise operators, use of bitwise relational operators.

17) Other features and Miscellaneous functions**(1)**

Use of atof(), atoi(), atol(), toupper(), tolower(), isalnum(), isalpha(), isdigit(),exit().

Rules :

ANSI C to be followed strictly

Structured programming techniques to be followed

Programs to be coded in 'C' should be preferably from Commerce / management fields.

Books:

- *Let us C* by Yashwant Kanetkar
- *C Programming* by Balgurusamy
- *Turbo C/C++ - The Complete Reference* by H. Schildt.
- *Programming in C* by S. Kochan.
- *Born to code in C* by H. Schildt.
- *The Art of C* by H. Schildt.
- *C Programming by Kernighan and Ritchie - 2nd Edition.*
- *Programming in ANSI C* by Agarwal
 - *C Programming with Problem Solving* by Jacqueline A Jones, Keith Harrow

Fundamentals of Information Technology [102]

- **Methodology must be case study oriented through out the syllabus.**
- **Faculty must design different cases and ask students to make presentations may be in groups and do proper assessment.**

- 1) System Concept** (2)
Definitions, Integrated Systems, Sub-systems, Modules,
Characteristics / Objectives / types of Systems.
- 2) Various Phases of Software Development Life Cycle (SDLC)** (2)
- 3) Role of Software Engineer / Analysts / Users in the various phases of Systems Development Life Cycle.** (2)
- 4) Different Approaches to Software Development** (4)
Waterfall Model , Spiral Model, Prototyping, RAD, Object Oriented, 4GL
- 5) Structured Systems Analysis Tools and Techniques** (2)
Fact Finding tools and techniques
Functional Decomposition Diagram (FDD)
- 6) Application System Modeling** (8)
Data Modeling through ER Model
Process modeling through Data Flow Diagrams (Logical / Physical)
Concepts of Object Oriented Modeling through State Transition
Diagrams
- 7) Database Design Methods** (6)
Mapping ER Diagram to arrive at the Relational Database
Data Normalization techniques
Controlled De-normalization
- 8) Logic representation techniques** (2)
Decision Trees
Decision Tables
Structured English
- 9) UML tools and techniques for web-based/object oriented Applications**
Class hierarchy Diagram, Use-Case Diagram, Sequence Diagram (3)
- 10) User Interfaces Design** (4)
Menu, Forms, Reports, Messages, Screens

- 11) Data Codification Schemes, Designing Code-less systems (1)
- 12) Standards of Source Code Development,
Structured Programming. (2)
- 13) Introduction to Computer Aided Software Engineering (CASE) tools,
Concept of Reverse Engineering. (2)

Books Recommended:

- *Analysis and Design of Information Systems 2e* by Senn
- *Software Engineering Practitioner's Approach* by Roger Pressman
- *Introduction to System Analysis & Design* by Hawryszkiewicz.
- *Systems Analysis and Design* by Elias Awad
- *Introducing Systems Analysis and Design* by Lee
- *Systems Analysis & Design* by Perry Edwards (McGraw Hill)
- *Systems Analysis, Design & Introduction to Software Engineering(SADSE)*
by Parthasarthy S, Khalkar B W

Principles and Practices of Management and Organisational Behavior (104)

The perspective

The purpose in designing and revising this courseware is to help the MCM students to get acquainted with the basic concepts of Management, Organisation, Organisational Behaviour and MIS, mainly from the managerial perspective.

Section 1: Essence of Management

Unit 1 Management (4)

- The need, scope
- Meaning and definition
- The process of management
- Managerial levels/Hierarchy
- Managerial functions
 - Planning
 - Organising
 - Staffing
 - Directing
 - Controlling
- Managerial skills
 - Technical
 - Conceptual
 - Human Resource
- Types of managers
 - Functional
 - Specialist
 - Generalist
- Line and staff managers

Unit 2 Evolution of Management Thought (4)

- 2.1 Historical perspective
- 2.2 Classical theories
 - Taylor
 - 2.2.2 Fayol
- 2.3 Behavioral
 - H.R. approach
 - Behavioral Science approach
 - Management Science approach
 - Systems approach – with reference to management, organisation and MIS

Contingency approach

Unit 3 Managerial Decision making (4)

- Introduction
- Decision making environment
 - Open system
 - Closed system
 - Decision making under certainty

Decision making under uncertainty
Decision making under risk

Decision types / models
Structured decisions
Unstructured decisions
Programmable decisions
Non programmable decisions
Classical model
Administrative model
Decision making styles
Autocratic
Participative
Consultative
Decision making tools
Herbert Simon's model
Principle of Rationality / Bounded Rationality

Section II Organisation and Organisation Behavior

Unit 1 Organisation (4)

Introduction - definition
Need for organisation
Process of organising
Organisational structure
Functional organisation
Product organisation
Territorial organisation
Customer segmentation
1.4.5 Matrix organisation

Unit 2 Organisational Behavior (2)

Definition / concepts
Need / importance / relevance
An overview

Unit 3 Individual Behavior and Understanding Self (4)

Ego state
Transactional Analysis
Johari window
Motivation

Unit 4 Group and Group Dynamics (4)

Unit 5 Team Building (4)

Unit 6 Leadership (3)

Unit 7 Conflict Management (3)

Unit 8 Theory X Y and Z (2)

Important note : The topics in Units 3, 4 , 5 and 6 should be covered with the help of atleast one exercise each. All topics in Organisation Behavior should be covered with the help of role plays , simulation , games etc.

Books Recommended :

- *Principles and Practices of Management* by Koontz & O'neal
- *Management Today Principles and Practices* by Burton & Thakur
- *Management Principles & Functions* by Ivancevich & Gibson , Donnelly
- *Organisational Behavior* by Stephen Robbins
- *Organisational Behavior* by Keith Davis
- *Organisational Behavior* by Fred Luthans
- *Organisational Behavior* by Dr. K. Ashwatthapa

Web Programming and E-Commerce [105]

SEMESTER 2

DATA STRUCTURES AND ALGORITHMS [201]

All coding is to be done in ANSI 'C'. Emphasis should be laid on the algorithmic features of various data structures.

1. Data Structure Concepts : Definition of Data Structure, precondition, Examples of data structures. Kinds of data structures, logical Implementation and Application levels of data structures. Node and Representative node of data structure, Empty data structure. Mathematical Structure, hardware Structure and Storage structure. Abstract Data Type (ADT) vis-à-vis data structure. [01]

2 Algorithm Concepts: Algorithmics, Concept of a well posed problem, Definition of Algorithm. Recursive and iterative algorithms, Objectives of algorithmics. Quality of an algorithm, Space complexity and Time complexity of algorithm, Frequency Analysis and Problem complexity. [01]

3 Arrays: Characteristics of an array. Definition of an Array, Positional value of a member, Base address of array, Indexing of an array, Index variable, Index type. Implementation of 1-D arrays, Row and Column Major implementations of 2-D, 3-D and n-D arrays. Simple examples illustrating address computations. Feature restricting the number of array implementations to two. [03]

4 Stacks: Stack as a data structure, Relationship component (LIFO) in stacks. Representative node for stack, uses of stack. Static and Dynamic stack. PUSH and POP operations for stack. ANSI 'C' implementations of PUSH and POP operations for stacks implemented as array and linked list. Algorithm for comparing static and dynamic stacks. Polish and reverse Polish notations. ANSI 'C' implantations of PUSH and POP operations for stacks implemented as array and linked list. Algorithm for comparing static and dynamic stacks. Polish and Reverse Polish Notations. ANSI "C" implantation of stack based algorithms for (a) Validating an expression for any mismatch of brackets, braces and parenthesis, (b) Converting an infix form to postfix form, (c) Conversion of an infix form to its prefix form, (d) Evaluation of a postfix form and (e) Evaluation of a prefix form. Simulation of recursion using stacks, stacks and nested calls. [06]

5 Queues : Queue as data structure, Relationship component (FIFO) Queue. Representative nodes (Front and Rear) for queue. Classification of queue as Linear Queue, (b) Circular Queue (c) Priority Queue. ANSI 'C' Implementations of algorithms for (a) Adding a node in queue, (b) Deleting a Node form queue Finding size of queue and (d) printing a queue, for linear And circular queues expressed as array and list. Dangling Pointer and Dynamic Queue. List implementation of PRIORITY QUEUE, Priority queue as a sorted list. ANSI 'C' algorithm for converting a dynamic stack into a dynamic queue and vice-versa, Concept of Double Ended Queue -DEQUE, Input Restricted DEQue (IRD), Output Restricted DEQUE (ORD). Comparison of add node

and delete node operations on different linear non recursive data structures viz. Stack, Queue, DEQUE, IRD and ORD, use of queue in multiuser OS like UNIX

[05]

6 Linked Lists: Concept of a Linked List as a run time equivalent of array. List versus array. Classification of a node as Atomic and List node. Internal pointer and External Pointer. Head and Tail of a list. NULL list, Length of a list. Classification of lists based on the number of internal pointers in a list node - Single and Double lists. Classification of lists based on the kind of collection - Linear list and Circular list. Linear Single List (LSL), Circular Single List (CSL), Linear Double List (LDL) and Circular Double List (CDL). ANSI 'C' algorithms for (a) Adding a node in a list, (b) Deleting a node from a list, (c) Finding length of a list and (d) Printing of a list for LSL, CSL, LDL and CDL. ANSI 'C' algorithms for (a) Sorting a LSL, (b) Creating a sorted LSL and (c) Merging of two sorted LSL. Use of LSL as a SET. Abstract representation of a list using bracket notation. Simple Linked List. Generalised Linked List with simple examples. Simple and Generalised sublists. Shared List, Shared list vis-à-vis sublist. Recursive list, Recursive list as circular and non-circular list, Recursive list as a shared list. Concept of Multilist List, Uses of Multilist Lists. ANSI 'C' algorithms for (a) Converting LSL to CSL and vice-versa and (b) LDL to CDL and vice-versa.

[06]

7 Trees : Concept of a Tree and Subtree. Tree as a recursive data structure. Representative node of tree (Root). Concept of a n-ary tree and Binary tree. Definitions of n-ary and 2-ary trees. 2-ary tree as Binary Tree, NULL tree. Definitions of Root, Father Node, Subtree, Left Subtree, Right Subtree, Son Node, Youngest Son Node, Brother Nodes, Ancestor Node, Descendent Node, Left Descendent Node, External Node, Weight of a tree, Level of a node, Height/Depth of a Tree. AVL Trees. Balance of a node, Weight Balanced Trees. Strictly Binary Tree, Complete Binary Tree of depth "d". Features of a complete binary tree. Almost complete binary tree of depth "d". Derivation of expression relating number of nodes of a complete binary tree with the depth of complete binary tree. Concept of an Ordered Tree. Binary Search Tree (BST), ANSI 'C' implementations of algorithms for (a) Adding a node in BST, (b) Deleting a node from BST, (c) Finding total number of nodes in a BST, (d) Finding total number of leaf nodes in a BST, (e) finding total number of nonleaf nodes in a BST. Concept of Tree Traversal - Inorder, Preorder and Postorder traversals of BST. ANSI 'C' implementations of algorithms for inorder, preorder and postorder tree traversals. "C" Algorithm for printing tree nodes in descending order. ANSI 'C' algorithms for (a) Creating a copy of any given BST and (b) Creating mirror image of any given BST. Representation of a simple BST as an array. Binary tree node and double list node. 'C' algorithms for (a) Level order traversal of a BST using linear queue and (b) Nonrecursive inorder traversal of any BST using stack. Concept of a Thread, Threaded binary trees, Left Threaded and Right Threaded binary search trees. Creation and inorder traversal algorithms for right threaded binary trees. Applications of trees in spellcheck software and publishing industry. Technique for converting a n-ary tree into a 2-ary tree. Huffman Algorithm, Symbol and Frequency Count of symbol. Huffman Tree, Features of a Huffman tree.

[06]

8 Sorting Algorithms : ANSI 'C' implementations for Bubble Sort, Insertion Sort, Quick Sort and Heap Sort for both ascending and descending order sorting.

[02]

9 Search Algorithms : ANSI 'C' implementations of algorithms for Linear Search and Binary Search.

[01]

10 Symbol Tables : Definition of a Symbol Table, Applications of Symbol Tables, Objectives of maintaining a symbol table. Static symbol table, Dynamic symbol table. Criterion for the selection of a storage pattern for symbol tables, AVL trees as builtin symbol tables, Inherent advantages and disadvantages of builtin symbol tables. User defined symbol Table, Concept of 1-D array as a user defined symbol table. Key of a symbol, Bucket, Bucket size, Key to address function - Hashing Function. HASH TABLE, Synonyms, Home address of a symbol, Collision, Bucket Overflow, Static and Dynamic techniques for extending bucket size for storing synonyms. Disadvantages of static technique. Chaining of synonyms through dynamic technique, Use of unsorted and sorted linear linked lists of keys in chaining. Disadvantage of using lists in chaining. Ideal Hash Table, Ideal Hashing Function - MINIMAL. Ideal user defined symbol table as a combination of 1-D array and AVL trees. ANSI 'C' implementation of simple hashing functions (a) Division Method, (b) Folding and (c) midsquaring.

[02]

11 Graphs : Concepts of Point/vertex and Edge/arc, Adjacent vertices. Sets of vertices and edges. Definition of a graph of "n" vertices, Directed and Undirected edges and their representations. Directed and Undirected graphs and their representations, DIGRAPH and directed graph. Definitions of Incidence of a graph, Adjacent vertices, Multigraph, Adjacent to, Adjacent from, Degree of a vertex, Indegree of a vertex in directed graph, Outdegree of a vertex, Total degree of a vertex in DIGRAPH, Maximum number of edges for undirected graph of "n" vertices, Complete Graph, Maximum number of edges in a DIGRAPH of "n" vertices, Complete DIGRAPH, Subgraph, path, and Adjacent vertices, Connected vertices, Connected graph, Connected vis-à-vis complete graph, Strongly Connected Graph, Strongly connected graph vis-à-vis complete DIGRAPH, Simple path, cycle, Cyclic graph, Acyclic graph, Directed Acyclic Graph - DAG. Description of tree as a graph. Adjacency matrix and adjacency list representations for directed and undirected graphs. Conclusions of graph features from its matrix and list forms. Reverse adjacency lists for DIGRAPH. Adjacency Multilist List representations of undirected and directed graphs. Concept of a Graph Search. Breadth First Search (BFS) and Depth First Search (DFS) for a graph. ANSI 'C' implementations of Breadth First Search and Depth First Search algorithms. Relationships between tree traversal algorithms and tree search algorithms. Concepts of a Weighted Edge and Weighted Graph. Representations of undirected and directed weighted graphs. Cost Matrix for weighted graph. Weighted Adjacency matrix for weighted graph. Concept of a network, fields of applications of GRAPH. [07]

Books recommended :

Data Structures Using "C"

by Tanenbaum.

Data Structures and Program Design in "C"

by Robert L. Kruse.

Fundamentals of Data Structures

by Horowitz and Sahani.

Data Structures : An Advanced Appraoch Using 'C'

by Esakov and Weises.

Data Structures and 'C' Programming

by Cristopher J. Vanwyk.

DATA BASE MANAGEMENT SYSTEM [202]

1 Introduction

- 1.1 History : Advantages and limitations of DBMS; Users of DBMS,
- 1.2 Software Modules in DBMS; Architecture of DBMS. (02)

2 Modeling Techniques

- 2.1 Different Types of Models, Introduction to ERD. (07)

3 Hierarchical Database

- 3.1 Introduction. (01)

4 Network Database

- 4.1 Introduction (01)

5. Relational Algebra

- 5.1 Select,Project,Union,Intersection, Difference,Cartesian Product, Simple Join. Queries to be solved based on the above. (03)

6. Relational Database

- 6.1 Introduction; Codd's 12 Rules; Concept of Domain, Tuple, cardinality; Comparison between HDB-NDB-RDB (04)

7 Normalisation

- 7.1 Advantages and disadvantages of Normalisation; 1NF-2NF-3NF-rules with examples; Anomalies. (04)

8 Integrity Constraints

- 8.1 Entity-Domain-Referential integrity rules; Assertion and Triggers concept. (04)

9 Recovery Mechanisms

- 9.1 Recovery from various problems of volatile and non-volatile storage devices; Concept-properties-states of Transaction; Introduction to mechanisms such as - Log, Checkpoint and Shadow Paging. (03)

10 Concurrency Controls

- 10.1 Problems of concurrent Transactions; Control Mechanisms such as - Locks, Time-Stamps, Optimistic Scheduling and MVT. (03)

11 Distributed Databases

- 11.1 Concepts, Data Distributions Techniques. (02)

12. Data Warehousing and Data Mining (03)

12.1 Concept, Architecture, Various tools in Data Warehousing, Tools in Data Mining, Difference between Data mining and normal query.

SQL commands.

List of SQL commands to be covered (03)

Create/drop a Database
Create /Modify/Alter/Drop Table

DML Commands
Insert
Update
Delete
Select

Aggregate Function
Max
Min
Avg
Count
Sum

GROUP BY
ORDER BY
HAVING

Books Recommended:

- *Introduction To Database Systems.* By C.J.Date
- *Data Base System Concept.* By Korth.
- *Data Management Systems* By Alexis Leon, Mathew Leon
- *Principals of Database Management* By James Martin.
- *Computer Database Organization* By James Martin.
- *Relational database design for Micro Computers applications* Prentice Hall (Jackson)
- *Introduction to Data Management Systems* By Atul Kahate
- *Fundamentals of Database Systems* By Elmasri, Navathe

ORACLE [203]

- Queries
(3)
Select with all options
Operators
Arithmetic
Comparison
Logical (in, between, like, all, %, _, any, exists, is null, and ,or, not, Distinct)
Order by clause
- SQL Functions
(4)
Date
Sys_date , next_day, Add_months, last_day, months_between,
Numeric
round, trunc, abs, ceil, cos, exp, floor
Character
initcap, lower, upper, ltrim, rtrim, translate, length, lpad, rpad, replace
Conversion
to_char, to_date, to_number
Miscellaneous
Uid, User, nvl, vsize, decode, rownum
Group function
avg, max, min, sum, count, with Group by and Having Clause
Nested functions
- Joins
(2)
Simple join
Equi join
Non equi join
Self join
Outer join
Set operators (Union, union all, intersect, minus)
- Sub queries and Corelated query
(2)
- DML statements (Insert, Update, Delete with where clause)
(2)
- TCL (Commit, Rollback, Savepoint)
- Locks in Oracle
- DDL Statements
- Data types
(1)
Character
Char, Varchar/varchar2, Long
Number
Number (p) - fixed point, Number (p,s) - floating point

- Date
- Raw
- Long raw
- Introduction to LOB datatypes (CLOB,BLOB, BFILE)
- Table
 - (2)
 - Create, Alter, Drop, Truncate,Rename
 - Constraints (Primary key, Foreign Key, Unique Key, Check, Default, Not Null, On delete, Cascade)
- Column level and Table level constraints
- Oracle Objects
 - (2)
 - Views, Sequences, Synonyms, Index (Define, Alter and Drop)
- Introduction to Object Oriented Concepts
 - (2)
 - Object type and Methods
- Introduction to Oracle Architecture
 - (1)
- Introduction to Report writing using SQL
 - (1)
 - (Ttitle, Btitle, skip, set, pause, column, sql.pno, Break on, compute sum, set server output on.)
- Creating Users and assigning privileges
 - (1)
- PL / SQL
 - (9)
 - Introduction to PL/SQL
 - Advantages of PL/SQL
 - PL/SQL Character Set
 - Data types
 - Character, Raw, rowid, boolean, binary_integer, number, Variable, constant
 - PL/SQL blocks
 - Attribute - %type, %rowtype
 - operators function comparison, numeric, character, date
 - control structure
 - sequential - goto
 - Error handling
 - concept of exception
 - pre defined exceptions -no_data_found, cursor_allready_open, dup_val_on_index, storage_error, program_error,zero_divide, invalid_cursor, login_denied, invalid_number, too_many_rows, dbms_output, user_defined exceptions
 - Cursor
 - Explicit & implicit Cursor, Cursor for loop, Parametric cursor, Declaring cursor variables, Constrained and unconstrained cursor variables, Opening

a cursor variable from a query, Closing cursor variables, Restrictions using cursor variables

Composite Datatypes

Record, Declaration, refer, record assignment

Table declaration, table attributes (count, delete, exists, first, last, next, prior)

- Database Triggers

(2)

Types of Triggers

Enabling, disabling

Predicates- inserting, updating, deleting

- Procedures and Functions

(2)

Definition, Implementation and Execution

- Packages

(2)

- Introduction to Oracle 9i

(2)

Books Recommended :

SQL – The complete Reference by Groff James & Weinberg Paul.

SQL for Professionals by Kishore Swapna & Naik Rajesh

SQL from the ground up by Pyofinch Mary

SQL Unleashed by Ladanyi Hans

Oracle 7 by Ivan Byross

Understanding SQL by Gruber Martin

Teach yourself SQL in 14 days by Morgan Bryan & Perkins Jeff

Oracle PL/SQL Programming by Scott Urman

Teach yourself PL/SQL in 21 days by Lucas Tom

Basic JAVA [204]

1	Introduction to JAVA	
	-History of Java	
	-Features of Java	
	-JDK Environment	
	-The Java Virtual Machine	2
	-Garbage Collection	
2	Programming Concepts of Basic Java	
	-Identifiers and Keywords	
	-Data Types in Java	
	-Java coding Conventions	6
	-Expressions in Java	
	-Control structures, decision making statements	
	-Arrays and its methods	
3	Objects and Classes	
	-Object Fundamentals	
	-Pass by value	
	-‘this’ reference	
	-Data hiding and encapsulation	
	-Overloading	
	-Overriding	10
	-Constructors	
	-Finalization	
	-Subclasses (Inheritance)	
	-Relationship between super class object and subclass object	
	-implicit subclass object to super class object Conversion	
	-Dynamic method dispatch	
4	Language Features	
	-scope rules	
	-static data, static methods, static blocks	
	-all modifiers of class, method, data members and variable	
	-Abstract Classes	
	-Interfaces	
	-Inner classes	10
	-Wrapper Classes	
	-packages	
	-Package access	
	-importing packages and classes	
	-user define packages	
5	Exception Handling	
	-Types of Exceptions	
	-try, catch, finally, throws keywords	
	-creating your own exception	

	-exceptions and Inheritance	3
6	Multithreading	
	-Multithreading Concept	
	-Thread Life Cycle	
	-Creating multithreading Application	5
	-Thread Priorities	
	-Thread synchronization	
7	Abstract Window Toolkit	
	-Components and Graphics	
	-Containers, Frames and Panels	
	-Layout Managers	
	-Border Layout	
	-Flow Layout	
	-Grid Layout	12
	- Card Layout	
	-AWT all Components	
	-Event Delegation Model	
	-Event Source and Handlers	
	-Event Categories, Listeners, adapters	
	-Anonymous Classes	
	-Applets	
	-Applet Life Cycle	
	-Applet Context	
	-Inter applet communication	
8	Java utility Packages , classes, Interfaces	
	HashTable	
	Vector	
	Priorities	
	Math	
	Random	6
	System	
	String	
	StringBuffer	
	Map	
	Enumeration	
9	Streams and File IO	
	-Files and Stream	
	-Stream classes	
	-Reader Writer classes	6
	-File class Tests and Utilities	
	-Serialization and de serialization	

Note : % of marks is just guideline to the paper setters. The paper setters may or may not use these guidelines.

Author	Title	Publisher and Address
Cay S Horstmann Gary Cornell	<i>Core JAVA 2 Vol-1 & Vol-2</i>	The Sun Micro Systems Press, New Delhi
Jerry R Jackson Alan L. McClellan	<i>Java by Example 1.2</i>	The Sun Micro Systems Press, New Delhi
Peter Van der Liden	<i>Just Java</i>	The Sun Micro Systems Press, New Delhi
Peter Van der Liden	<i>Not Just Java</i>	The Sun Micro Systems Press, New Delhi
Jaffry A Borrer	<i>OOP with Java An ultimate Tutorial</i>	The Sun Micro Systems Press, New Delhi
E. Balguruswamy	<i>Programming with java, A Primer</i>	The Sun Micro Systems Press, New Delhi
Deitel and Deitel	<i>Java How to Program</i>	Prentice Hall Upper Saddle River, New Jersey 07458 (US)

**The practical should cover minimum 100 programs.

**The practical term work should be done by the student. The print out of the programs should be kept in Term work file.

CORE RUBY [204]

Fundamentals (3 lectures) - What is Ruby; Ruby download and installation; irb and SciTE; Free format; Case sensitive; Comments; Statement delimiters; Documentation; Operators (with precedence and associativity rules); Ruby editors; .rb file; Concept of an object and that everything is an object in Ruby; Object class and its methods; Usage of puts, gets methods; Ruby conventions; Garbage collection

Variables and Constants (2 lectures) - Name characters; Variables - local, instance, class, global; Constants naming, rules and concept of scope operator ::; Naming conventions; Dynamically typed; Usage of method type

Numbers (1 lecture) - Concept and usage with Class Numeric, Float, Integer, Fixnum and Bignum

Strings (4 lectures) - String literals using single- and double-quotes and their differences; Usage of #{expression}; Conversions using .to_i, .to_f, .to_s; Usage of <<; Concept of symbols; Class String methods like chomp, reverse, length, upcase, downcase, swapcase, capitalize, strip, length, index, slice, upcase!, downcase!, swapcase! and capitalize!.

Random Numbers (1 lecture) - rand method

Arrays (2 lectures) - Concept; Class Array methods like delete, sort, length and each using do end

Concept of Ranges and Hashes (2 lecture)

Constructs (1 lecture) - if else end elsif; while end; case when end

Regular Expressions (2 lectures) - Simple examples

Methods (3 lectures) - Writing own methods using def end; class and instance methods (with getter and setter); return and concept of value returned by last statement in a method; variable number of parameters using *

Code Blocks (3 lectures) - Using do end and { }; Usage of yield method; Concept of Proc and it's method call; lambda

File I/O (3 lectures) - File class and its method open

Writing a class (4 lectures) - Standard class Class; initialize; new methods; Access modifiers private and protected; Usage of attr_reader, attr_writer, attr_accessor; Concept of inheritance and using <; Using super

Concept of Duck Typing (1 lecture)

Modules (1 lecture) - Examples of writing a module; Usage of require and include; Concept of mix-ins

Exception handling (2 lectures) - Exception class and its hierarchy; begin rescue ensure end;

Concept of Unit Testing (2 lectures)

Standard Classes and Modules (3 lectures) - Usage of Dir, Time, Thread, Range, IO, Module, GC, Kernel, Math - usage

Recommended Books:

- a. Programming Ruby by Dave Thomas
- b. Learn to Program by Chris Pine
- c. Ruby For Rails by David Black
- d. Beginning Ruby by Peter Cooper

Object Oriented Designing [205]

SEMESTER 3

Linux Programming[301]

1	LINUX OPERATING SYSTEMS	10
	Linux Operating System Concepts and Architecture Overview of the Linux Kernel, User Space, Kernel Space, Processes and Daemons, Process Control Overview of Linux Administration Linux Filesystem, User, Group and Resource Management Configuration Files Overview Filesystem Permissions, Access Permissions and Security, Common Filesystem Commands, Recursion Option in Commands , Find, Grep, Cat, More, Less and Sort Commands Installation, Partitioning and Disk Management, Disk Naming, Planning the Disk Partitioning Scheme, Disk Management Practices, Installing and Selecting Software, Selecting Services for Startup, Configuration Utilities, Updating Software and Package Management System Startup, Shutdown and Reboot System Boot Process Runlevels, Rc.d and init.d Directories, Startup Scripts, PS Command Options,Top, and Nice/renice Inetd/Xinetd Superdaemon, Restarting Services After Configuration Changes Terminating Process, Init Command, Shutdown Command Data Backup, Restore and Disaster Recovery Backup Considerations, Backup Types, Backup Utilities and Methods Scripting Backup, Restoring Data, Booting with Rescue Disk	
2	Apache Web Server	8
	Linux distribution Apache Installation Starting and stopping Web Server Apache Configuration files Apache Directives Server Configuration Directory level configuration: htaccess and <Directory> Access Control URL Pathnames MIME types CGI files Automatic directory Indexing	

	<ul style="list-style-type: none"> Authentication Log files Virtual Hosting <ul style="list-style-type: none"> IP Address Virtual Host Name Based Virtual Host Dynamic Virtual Hosting Server Side includes Apache GUI Configuration Tools “ comanche and linuxconf Web Server Security -SSL Apache Web Server Configuration files 	
3	<p>MYSQL DATABASE SERVER</p> <ul style="list-style-type: none"> Installation <ul style="list-style-type: none"> precompiled packages post installed configuration post installed troubleshooting MySQL Administration Commands <ul style="list-style-type: none"> myisamchk mysql mysqladmin mysqlbug mysqlimport mysqlshow Creating users and granting them permissions Creating databases Data types Creating a table Graphical tools 	10
4	<p>PHP PROGRAMMING</p> <ul style="list-style-type: none"> Obtaining, Installing and Configuring PHP Obtaining PHP Source Code Installing PHP from Binary Packages PHP and Security Considerations PHP Configuration Parameters and the php.ini File Language Options ,Register Globals and Security Resource Limits Parameters,Error Handling and Logging Parameters Data Handling Parameters , Paths and Directories, Dynamic Extensions, Checking Install with phpinfo Function. Introduction HTML/XHTML and HTTP Basics Review PHP and the Web Server Architecture Model Overview of PHP Capabilities CGI vs. Shared Object Model PHP HTML Embedding “ Tags and Syntax 	12

Simple PHP Script Example
PHP and HTTP Environment Variables

PHP Language Core

Variables, Constants and Data Types, and Operators
Decision Making , Flow Control and Loops
Arrays and Array Operations , Two-Dimensional and Multi-dimensional Arrays, Strings and String Operations
Functions, Function Declaration and Parameter Passing
Outputting Data & Include and Require Statements
File and Directory Access Operations
Error Handling and Reporting Considerations

Processing HTML Form Input from the User
Creating a Dynamic HTML Form with PHP
Login and Authenticating Users
Using GET, POST, SESSION, and COOKIE variables
Session Management and Variables
Working with Cookies, Sending Email
Object-oriented PHP: Classes and Constructors

Database Operations with PHP

Built-in Database Functions, Connecting to a MySQL Database
Selecting a Database, Building and Sending the Query to Database Engine, Retrieving Results & Retrieving, Updating and Inserting Data
Sample Database Routines and Code Segments, Logging Database Operations for Troubleshooting

Books Recommended :

- *The Complete reference Linux* & “peterson &” Tata McGraw Hill.
- *Beginning Linux Programming* & “Wrox Press
- *Beginning PHP, Apache, MySQL Web Development*
- *Teach Yourself MySQL in 21 days* - Techmedia

BUSINESS APPLICATIONS [302]

Sales and Distribution	06
Sales Budgeting – Market segments / Customers / Products	
Customers Enquiry and preparation of Quotation	
Customer Order processing – from Order acknowledgement to dispatch and invoicing	
Pending Customer orders – follow up	
Sales Analysis	
Network of Sales outlet – Distributed Databases	
While explaining this application consider an organisation manufacturing multiple products with sales outlets spread across the country.	
Manufacturing	10
BOM processing with product configuration	
MPS	
Capacity Requirements Planning for Equipment, Manpower and Time	
MRP	
Production Planning – work order management – EOQ, EBQ	
Shop floor control – calculation of labour efficiency, productivity and equipment down – time analysis	
Material procurement – Indenting, Purchasing, Vendor analysis, supplier's Bill passig and receipt of material.	
Stock accounting and control – raw material, work-in-process and Finished goods	
Job / Product / WIP costing – std, FIFO, LIFO, Avg, Wtd. Avg	
Sub-contracting of work to outside vendors	
Financial Accounting	12
Accounting – General Ledger	
Balance Sheet, P&L , Schedules	
Trial Balance	
Journals / Day books	
Ratio / Expense analysis	
Account Receivable	
Account Payables	
Human Resource	12
Employee Database	
Recruitment	
Employee appraisal	
Employee training	
Leave accounting	
Payroll	
Salary calculation and reporting	
Income Tax calculation and reporting	
Loan accounting	
PF and gratuity	

Bonus, Ex-gratia, Incentive, Superannuation
Arrears calculation

BOOKS RECOMMENDED –

MIS by W.S. Jawadekar

MIS by Jerome Kanter

MIS by Gordon B. Davis

MIS by Laudon and Laudon

Marketing Management by Philip Kotler

Fundamentals of Financial management by Prasanna Chandra

Personnel management by C. B. Mammoria

Human Resource and Personnel Management by K Aswathapa

Production and Operations Management by Mayer

Modern Production Management by R V Badi

Note :- Figures to the right indicate no of lectures for the topic.

ADVANCE JAVA [303]

1. NetWorking (5 lectures)

Networking basics, Socket, port, Proxy servers, Internet addressing and URL, java.net - networking classes and interfaces, Implementing TCP/IP based Server and Client. Classes to be covered Socket, ServerSocket, IPAddress, URL connections; Programs on chatting 1-1 & 1-M (Threading)

2. JDBC (5 lectures)

Types of JDBC Drivers, Writing JDBC applications using select, insert, delete, update; Types of Statement objects (Statement, PreparedStatement and CallableStatement); ResultSet, ResultSetMetaData; Inserting and updating records, Connection Pooling.

3. RMI (1 lecture)

Introduction of RMI & Architecture (No programming is expected)

4. Java Beans (1 lecture)

Introduction to Java Bean

Rules for writing a Simple Bean

5. Java Naming Directory Interface API (1 lecture)

Java Naming Directory Interface concept

6. Servlets (12 lectures)

Student should know how to configure TOMCAT; directory structure for a web Application; Servlet API Overview; Writing and running Simple Servlet. Servlet Life Cycle, GenericServlet and HttpServlet, ServletConfig & ServletContext; Writing servlet to Handle Get and Post Methods, Reading user request data; Writing thread safe servlets, Http Tunneling, Concept of cookie, Reading and writing cookies; Need of Session Management. Types of Session management; Using HttpSession Object ; Servlet & JDBC

7. JSP (12 lectures)

Why JSP? JSP Directives, writing simple JSP page; Scripting Elements; JSP Actions: JSP & Java Beans; JSP Actions: include, forward and plugin, Managing sessions using JSP; JSP & Databases; Error Handling in JSP; Writing custom tags; JSTL - c, x, fmt, sql, fn, Expression Language, Implicit objects - (request, response, pageContext, session, application), Comments; Java Beans and JSP; Different scopes in a JSP page; Using JDBC in JSP; Study and Development of a Web Application and an Assignment. Tags c:out, c:set, c:if, c:catch, c:choose, c:when, c:otherwise, c:redirect, c:forEach, fmt:parseDate, fn:escapeXml, sql:query, sql:update

8. Introduction to Struts (3 lectures)

(A Web Application Framework) - struts-config.xml; Understanding MVC architecture; *ActionServlet*, *ActionForm*, *ActionMapping*, *Action* classes.

Books Recommended :

Core Java Volume-I, Horstman and Cornell, Pearson Education

Core Java Volume-II, Horstman and Cornell, Pearson Education

Inside Servlets - Dustin R. Callway- Pearson Education

Developing Java Servlets - James Goodwill. Techmedia.

JSP Professional - Wrox Press

Java Server Programming - Volume I and II - Wrox Press

Java Tutorial Continued - Campione, Walrath, Humal and Tutrial Team -

Addison Wesley

The Complete Reference J2EE - Jim Keogh - Tata McGRAW Hill

SCWCD Exam Study kit - Hanumant Deshmukh

O'Reilly Book on Servlet and JSP

ADVANCE RUBY [303]

- **Socket Programming [8]-**
 - Usage of TCPServer and TCPSocket Classes for Date and Time
 - Basic Networking
 - Port
 - Internet Addresses
 - Sockets
 - Socket classes
 - The Date Time Server and Client
- **Ruby/Tk [6]-** Simple Ruby/Tk applications; Logger class
- **WebServices [6] -** Introduction
- **Ruby with MySQL [6] -** Introduction
- **SMTP class [4] -** An introduction
- **Ruby on Rails [10] -** An introduction

Recommended Books:

Programming Ruby by Dave Thomas
Learn to Program by Chris Pine
Ruby For Rails by David Black
Beginning Ruby by Peter Cooper

VB.NET [304]

SOFTWARE PROJECT MANAGEMENT [305]

- Methodology must be case study oriented through out the syllabus.
- Faculty must design different cases and ask students to solve them(may be in groups) and do the proper assessment

1. Software Project Management, Concepts, Umbrella Activities under Software Project Management. (03)

1. Software Project Planning tools and techniques , Work breakdown Structure, Milestones, Software Sizing, Rayleigh curve etc.
Cost Estimation techniques like COCOMO, Function Point Analysis and other Cost Estimation methods. Time Estimation Tools like CPM/PERT, Gnatt charts and other methods, COCOMO for time estimation etc. (Use of MS-PROJECT is recommended). (6)

3. Software Project Maintenance – Types, steps, Resource planning and estimation, Re-engineering the software products, Documentation standards, Version Control and Software Configuration Management. (6)

4. Software Quality Management, QC and QA, V & V Planning, tools and techniques(reviews, inspections, walkthroughs etc.), Software Quality parameters with their definitions, Introduction to ISO and CMM. (6)

5. Software Testing Techniques, test plans, Introduction to Manual testing and Automated testing tools. (3)

6. User Acceptance Testing and Implementation Planning, Steps, methods, Documentation etc. (3)

Software Risk Management – concepts, need, steps (3)

IT Management Functions – Resource Management, Overview of various functions, Requirements planning, sizing, benchmarking, documentation etc. (2)

Software and Hardware Acquisition Plan and standards (2)

IT-HR Management – Selection, retention, training, career path planning, various practices and controls necessary in HR Management. (2)

IT-Operations Management – Scheduling, roles and responsibilities, procedures, practices, standards etc. (2)

Performance Evaluation methods for Hardware, Software and Personnel. (2)

Books Recommended

- *Software Project Management* by Edwin Bennatan
- *Software Engineering* by Roger S Pressman
- *Software Engineering* by Martin L Shooman
- *TQM for Computer Software* by Dunn and Ullma
- *Management of Information Technology* by Pravin Mulay.
- *Software Project Management in Practice* by Pankaj Jalote
- *Software Project Management A concise study* by S A Kelkar

SEMESTER 4

Mobile Computing [401]

Mobile Computing

INTRODUCTION (9)

Medium access control - Telecommunication systems - Satellite systems - Broadcast systems.

STANDARDS (9)

Wireless LAN - IEEE 802.11 - HIPERLAN - Bluetooth.

ADHOC NETWORKS (9)

Characteristics - Performance issues - Routing in mobile hosts.

NETWORK ISSUES (9)

Mobile IP - DHCP - Mobile transport layer - Indirect TCP - Snooping TCP - Mobile TCP - Transmission / timeout freezing - Selective retransmission - Transaction oriented TCP.

APPLICATION ISSUES (9)

Wireless application protocol - Dynamic DNS - File systems - Synchronization protocol - Context-aware applications - Security - Analysis of existing wireless network .

Total No of periods: 45

References:

1. J. Schiller, *Mobile Communications, Addison Wesley, 2000.*
2. <http://www.bluetooth.com/>
3. William C.Y.Lee, *Mobile Communication Design Fundamentals, John Wiley, 1993.*

ASP.NET [402]

Information Security [403]

CYBER LAW [404]

- Access Control : Operating system Access Controls, Group and Roles, Access Control lists, Unix Operating System Security, Windows NT, Capabilities, Added Features in Windows 2000, Granularity, Sandboxing and Proof-carrying code, Hardware protection, Other technical Attacks. (8)
- Cryptography & PKI : Symmetric Cryptography, Asymmetric Cryptography, Keys, Hash Functions, Digital Signatures. (5)
- Distributed Systems - Concurrency, Fault Tolerance and Fault Recovery, Naming. (3)
- Multilevel and Multilateral Security : Multilevel Security, Multilateral Security (3)
- Electronic Banking –Banking and Bookkeeping. (2)
- Monitoring Systems –Introduction, Alarms, Prepayment Masters. (3)
- Biometrics : Physiological biometric techniques, behavioral biometric techniques, New biometric techniques, biometric systems. (3)
- 8. Incident Response : Incident Response, Prerequisites to planning an IRT. (3)
- 9.Network attack and Defence : Most Common Attacks, Scripts Kiddies and Packaged Defence. (4)
- 10.Management Issues : Organisational Issues, (2)
- 11.Protecting E-commerce Systems – Introduction (2)
- 12.Hacking – Introduction (2)

. At least two Case Studies on each topic.

BOOKS RECOMMENDED

- *Cyber Laws* – Singh Yatindra
- *Cyber Crime* – Bansal S K
- *Cyber law , E-commerce & M-Commerce* – Ahmand Tabrez
- *Handbook of Cyber and E-commerce laws* – Bakshi P M & Suri R K

Multimedia and Web Designing [405]

Quality Control and Software Testing [406]

NETWORK TECHNOLOGY[407]

Basic Theory

(05)

Types of Networks
Peer-Peer Networks
Client/Server Networks
Host Terminal Network
Wireless Network
Wi-Fi Network
Virtual Private Network
Internet

Intranet Protocols (05)

Network Protocols
TCP/IP (IP4 & IP6)
SPX/IPX
NETBEUI
Tunneling Protocols PPTP, L2TP,IP,SEC

Application Protocols
FTP,TELNET,HTTP,HTTPS

Mail Protocols
SMTP,POP,IMAP

Frame Formats & Standards
Ethernet 802.2,802.3
Wireless 802.11a,802.11g

b. Network Components (03)

- ❖ Connectivity Components
 - Connectors RG45, Cables CAT 5, CAT 5E, CAT 6
 - Ethernet Cards, HUBS,Switches,Routers
- ❖ Modems
 - Dial-up Modem , ISDN Modem
 - DSL(Cable) Modem
 - Using Ethernet Card for Accessing Internet

c. Topologies (Bus, Star, Ring and Wireless loop) (02)

II Microsoft Network Technology (10)

a. Features of Microsoft Windows Server 2003

Server Roles
File and print server
Web server and Mail server Web application services
Terminal server
Remote access and virtual private network(VPN) server
Directory services, Domain Name system(DNS), Dynamic Host Configuration
Protocol(DHCP) server, and Windows Internet Naming Service(WINS)

b. Services

- ❖ Clustering Services
- ❖ Network load Balancing
- ❖ Security
- ❖ Common Language Runtime

- ❖ Internet Information Services(IIS 6.0)
- ❖ File and Print Services
- ❖ Active Directory
- ❖ Microsoft Software Update Services
- ❖ Storage Management
- ❖ Terminal Service
- ❖ Enterprise UDDI service
- ❖ Windows Media Services
- ❖ Microsoft .NET Framework
- ❖ Automated Deployment Service
- ❖ Windows Rights Management Service(RMS)
- ❖ Windows SharePoint Service

c.Features of various types of Servers

Standard Server
 Enterprise Server
 Data Center Server
 Web Server
 Small Business Server

d. Installation (10)

- ❖ Installing 2003 Server
- ❖ Server Application Installation
- ❖ Installing and Configuring terminal Server
- ❖ Remote Installation Services
- ❖ Implementing Active Directory and domain
- ❖ Implementing Group Policy
- ❖ Implementing Web services using IS
- ❖ Implementing Remote Access Services RADIUS Server
- ❖ Implementing Windows 2003 VPN
- ❖ Configuring Printer
- ❖ Configuring Backup
- ❖ Adding users to groups
- ❖ Configuring Firewall
- ❖ Configuring DHCP Server
- Building small office and home network using WIN XP and WIN 2000
- Installing .NET Frame on Clients

III. LINUX Network Technology (10)

a. Concepts

Linux File System and structure
 Default directories
 Network services
 http,https,ftp,nfs,BOOTP,DHCP

b. Basic commands

User Management
 File Management
 Process Management

Printer and Device Management	
Network Management	
Package Management	
c. Installation	(10)
Installing Linux server from CDs	
Installation Types	
Installation Class	
Preparing Partitions	
Selecting Packages	
Creating Boot Disk	
Installing from Network	
Installation Server	
Selecting Installation source	
Configuring x-windows	
Configuring apache web server	
Configuring DHCP server	
Configuring firewalls	
Installing and configuring packages	
Preparing Remote boot thin client for Linux(pxes)	
(for Linux RedHat Fedora 3 is to be used)	

Books Recommended:

1. *Introduction to Networking* Recharad McMohan Tata McGraw Hill Publication
2. *Computer Network Fundamentals and application* – R S Rajesh Vikas Publication
3. *Unleashed Windows 2003 Server* – Todd Brown & Chris Miller Techmedia SAMS Publication
4. *Microsoft Windows 2000 Professional* – Paul Cassel Techmedia SAMS Publication
5. *Fedora 3 Bible* – Christopher Negus Wiley Dreamtech Publication

Websites : www.microsoft.com/server/2003/
www.redhat.com/fedora3/

Project [408 & 409]

A project report has to be submitted as per the rules described in (IV).
Some additional guidelines regarding the Project Report are:

Number of Copies:

The student should submit two hard-bound copies of the Project Report.

Acceptance/Rejection of Project Report:

The student must submit a Synopsis of the project report to the Institute for approval. The Director holds the right to accept the project or suggest modifications for resubmission. Only on acceptance of draft project report, the student should make the final copies.

Format of the Project Report:

The student must adhere strictly to the following format for the submission of the Project Report.

a. Paper:

The Report shall be typed on white paper, A4 size or continuous computer stationary bond, for the final submission. The Report to be submitted to the University of Pune must be original and subsequent copies may be photocopied on any paper.

b. Typing:

The typing shall be of standard letter size, double spaced and on one side of the paper only, using black ribbons and black carbons.

c. Margins:

The typing must be done in the following margins :

Left ----- 35mm, Right ----- 20mm

Top ----- 35mm, Bottom ----- 20mm

d. Binding:

The Report shall be rexin bound in black. Plastic and spiral bound Project Reports not be accepted.

e. Front Cover:

The front cover should contain the following details :

TOP : The title in block capitals of 6mm to 15mm letters.

CENTRE: Full name in block capitals of 6mm to 10mm letters.

BOTTOM: Name of the University, Year of submission - all in block capitals of 6mm to 10mm letters on separate lines with proper spacing and centering.

f. Blank Sheets:

At the beginning and end of the report, two white black bound papers should be provided, one for the purpose of binding and other to be left blank.

Abstract:

Every report should have an Abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters. The abstract should not exceed 800 words.

Contents:

The Contents shall follow the abstract indicating the title of the chapters, section, subsection etc.

The report should contain the following :

- Institute Certificate
- Certificate from Company
- Acknowledgments
- Abstract
- List of Figures
- Tables
- Nomenclature and Abbreviations

Contents of the Project Report:

1. Company Profile (only for M.I.S. projects)
2. Introduction to the project
3. Scope of Work
4. Existing System and Need for System
5. Operating Environment - Hardware and Software
6. Proposed System
 - 6.1 Objectives to be fulfilled
 - 6.2 User Requirements
 - 6.3 Requirements Determination Techniques and Systems Analysis Methods Employed
 - 6.4 Prototyping
 - 6.5 System Features
 - Design of Input
 - Design of Output screens and reports
 - Module specifications
 - D.F.D.'s and ER's
 - System flow charts
 - Data Dictionary
 - Structure charts
 - Database / File layouts
 - User Interfaces
 - Coding system
 - Design of Control Procedures
 - Design of Exception Handling
6. Testing Procedures and Implementation Phases
7. Acceptance Procedure
8. Post-Implementation Review
- 9 User Manual
 - Menu explanation
 - User guide
 - Expected problems/errors and their solutions
10. Problems encountered
11. Drawbacks and Limitations

12. Proposed Enhancements
13. Conclusions
14. Bibliography

Annexures

- Sample documents (manual or computer generated)
- Source code listing in a separate file
- Output reports

List of Tables:

The Contents shall be followed by a 'List of Tables' indicating the table number, table title and the corresponding page number(s). The table number shall be in decimal point notation indicating the chapter number and the table number in that chapter.

NOTE : Any reference within the text shall be given by quoting relevant number. eg : 'Table 5.2'

List of Figures:

The 'List of Figures' shall follow the 'List of Tables' indicating the figure numbers, figure titles and corresponding page number. The figure numbers shall be in decimal point notation.

Nomenclature and Abbreviations:

The 'Nomenclature and Abbreviations' shall follow the 'List of Figures' and contain the list of symbols and abbreviations and their long names used. The nomenclature should be given for ER's, DFD's, STRUCTURED CHARTS, RUN CHARTS and for all other symbols in the techniques used. The nomenclature for every techniques should appear on a separate sheet. As far as possible, accepted standard symbols shall be used.

Chapter Numbering:

The chapters shall be numbered in Arabic numerals. Section and subsections of any chapters shall be in decimal notation. All chapters shall begin on a new page. The titles for the chapters and the title shall be properly centered at the top of the page and have three spaces between them.

Company Profile:

This chapter should highlight the company details. This would be chapter 1 and should include the main stream activity of the company, the product line of the company and the details of the department where the student was working. This should not exceed two pages or 800 words.

N.B.: Only relevant for M.I.S. Projects.

Introduction:

The 'Introduction' shall highlight the purpose of project work. It will also define the chapters to be followed in the Project Report.

Existing System and the Need for the System:

If there is some system already in use, then a brief details of it must be included, to help the examiner understand the enhancements carried out by the student in the existing system. Based on this, the student should exemplify the need for the

system. If there is no existing Computerised system, the need for computerisation should be given.

N.B.: Only where relevant.

Proposed System:

1. **Objectives** : clearly define the objective(s) of the system in a few lines.
2. **User Requirements** : State the requirements of the user in an unambiguous manner.
3. **Requirements Determination Techniques and System Analysis Methods Employed** : Use the formal methods to describe the requirements of the user, like Fact finding Methods, Decision Analysis, Data Flow Analysis etc.
4. **Prototyping** : If the prototypes has been developed prior to the detailed design, then give details of the prototype.
5. **System Features**
 - 5.1 Design of Input : Inputs, Data Dictionary, Screens, Validation Methods etc.
 - 5.2 Design of Output : Outputs, Reports etc.
 - 5.3 Design of Control Procedures : Structured charts, Module Specifications, Run charts etc.
 - 5.4 Design of Exception Handling : Error handling and recovery procedures.

The choice of including topics in this chapter entirely depends on the student. The freedom given for this chapter is obvious. Students will be working on various types of projects. A typical M.I.S. development project must include DFD's and structured charts etc. Thus a student is allowed to employ the techniques of his/her own choice suitable to his/her work. However, there is a guideline that the student must employ the techniques taught during the MCM course.

