

## MC 4.1 SOFTWARE ENGINEERING

1. Software and Software Engineering  
The importance of software – software – software myths – software engineering paradigms – generic view of software engg.
2. Measures and metrics – estimation – risk analysis – scheduling – size oriented metrics – function oriented metrics – metrics of software quality.
3. Software project estimation and Planning  
Decomposition techniques – LOC and FP estimation – effect estimation - risk analysis – identification – projection – assessment – management and monitoring – software re-engineering.
4. Requirement Analysis  
Requirement analysis – tasks – analyst – software prototyping – specification principles – representation and the software requirements specification.
5. Object oriented Analysis and data modeling:  
Object Oriented concepts – identifying objects – specifying attributes – defining operations – inter object communication – finalizing object definition – object oriented analysis modeling – data modeling – data objects, attributes and relationships – entity relationship diagrams.
6. Alternative analysis techniques  
Requirement analysis methods – data structure oriented methods – data structures system development – Warner diagrams and the DSSD approach – Jackson system development.
7. Software Design fundamentals  
The design process – design fundamentals – effective modular design – data flow oriented design – transform analysis – transaction analysis – design heuristics.
8. Object oriented Design  
Object oriented design concepts – object oriented design methods – refining operations – program components & Interfaces – implementation detail design.
9. User Interface design  
Human factors – Human computer interface design – interface design guidelines – interface standards.
10. Software Quality Assurance  
Software quality factors – quality assurance, quality metrics, Halstead's S/W Science.
11. Software Testing Techniques  
S/W Testing Fundamentals – white Box Testing, black Box Testing, Validation Testing, System Testing, Debugging.
12. Software Maintenance  
Maintainability – maintenance Tasks – Reverse Engineering and Re-engineering.

Text Book:

Roger S. Pressman – “Software Engineering”, Mc Graw Hill.

### **MC 4.2 PROGRAMMING IN JAVA**

1. Introduction:- Genesis of java, Overview of Java, data types, variables, arrays, operators and control statements.
2. Classes and Objects: Concepts of classes and objects, method overloading, constructors, constructor overloading, usage of static with data and methods, usage of final with data, methods and classes, Garbage collector, call by value, call by reference, access control, recursion, nested classes, inner classes, anonymous inner classes.
3. Inheritance: Concepts, Composition, difference between inheritances in Java, usage of super keyword, method overloading, abstract classes, dynamic method dispatch.  
Packages: Concepts, Package & import keywords, class path, defining, creating and accessing a package.
4. Interfaces: Differences between classes and interfaces, application of interfaces, multiple inheritance in Java, extending and initializing fields in interfaces. Exception handling – concept of Exception handling, types of exceptions, usage of try, catch, throw, throws, finally keywords.
5. Multithreading: Concepts of multithreading, life cycle difference between process and thread, creating multiple threads using thread class of runnable interface, synchronization, thread priorities, inter thread communication, Daemon threads, Deadlocks and thread groups.
6. Event Handling: Event classes, event listeners, delegation event model, handling mouse & Keyboard events, adapter classes  
AWT:- Concepts of components, container, panel, window, frame, canvas, font class, color class and graphics.
7. AWT Controls: Buttons, labels, Text field, text area, check boxes, check box groups (radio buttons), lists, choice, scroll bars, layout managers viz flow, border, grid, card, grid bag.  
Applets: Concept of applet, life cycle of applets, types of applets, creating applets, applet communication.
8. Java Library: String handling, Java.util, java.net, java.io  
Networking: Basics of networking, inetaddress, TCP/IP sockets, data grams, URL, URL connection.

#### **Suggested Books:**

1. Bruce Eckel: Thinking in Java, 1999 Prentice Hall OTK.
2. Herbert Schildt & Patrick Naughton : The Complete Reference Java 2.0
3. Iver Harton: Beginning in Java 2.0 – Wrox Publications
4. Dietel & Dietel: Java 2.0 – How to Programming.

1. INTRODUCTION : Algorithm, pseudo code for expressing algorithms, analysis, time complexity and space complexity, O-notation, Omega notation and theta notation, Heaps and Heap sort, Sets and disjoint set, union and find algorithms.
2. DIVIDE AND CONQUER : General method, merge sort , quick sort, strassen's matrix multiplication.
3. GREEDY METHOD : General method, optimal storage on tapes, knapsack problem , job sequencing with deadlines, minimum spanning tree, Single source shortest paths.
4. DYNAMIC PROGRAMMING : General method, Multistage Graphs, optimal binary search trees, 0/1 knapsack problem, reliability design problem, Traveling sales person problem, floor shop scheduling.
5. SEARCHING AND TRAVERSAL TECHNIQUES : Efficient non recursive binary tree traversal algorithms, tree traversal , breadth first search and traversal, depth first search and traversal, AND / OR graphs, game tree, Bi-connected components.
6. BACK TRACKING : General method, n-queen problem, sum of subsets problem, graph colouring , Hamiltonian cycles.
7. BRANCH AND BOUND : LC search, bounding, LC branch and bound, FIFO branch and bound, Travelling sales person problem.
8. NP – HARD AND NP - COMPLETE PROBLEMS : Basic concepts, non-deterministic algorithms, NP- HARD and NP- COMPLETE classes, COOKS theorem.

**BOOKS :**

1. E. Howrowitz and Shanl, Fundamentals of computer algorithms, GALGOTIA PUBLICATIONS.
2. ULLMAN, Design and analysis of algorithms, Addison wisely – 1994.

#### MC 4.4.1 ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS

1. Artificial Intelligence definition, introductory study of AI techniques, problems and problem spaces production systems, characteristics, heuristics.
2. Problem solving method forward and back ward reasoning, problem trees, problem graphs, generate and lest hill climbing, search methods, problem reduction, constraint satisfaction, mean\_ends analysis, game\_playing, Min\_Max algorithm, Alpha\_beta heuristics.
3. Knowledge representation ( logic ) – representing facts in logic, predicate logic, resolution unification, question answering, Non monotonic reasoning, statistical and probabilistic reasoning.
4. Knowledge representation – ( structured ) declarative representation, semantic nets, frames, scripts, procedural representation.
5. Problem solving systems planning, system organization, Expert systems, case studies, Introduction to Neural networks.
6. Natural language understanding – problems in understanding natural language syntactic analysis, semantic analysis, understanding multiple sentences, language generation, machine translation.
7. Computer vision – perception, techniques used in solving perceptual problems, constraint satisfaction, Waltz algorithms, Learning – random learning and Natural nets, rote learning, learning by parameter adjustment, concept learning by teaching , learning through examples, learning through mistakes, learning by analogy, skill acquisition.
8. LISP & PROLOG : Intro9duction to LISP, S-expression, functions, function definition, recursion, loop statements, simple programs. Introduction to Prolog, facts, rules, variables, satisfying goals, lists, recursive search, mapping, backtracking and cut, simple programs.

#### Text Books :

1. Elaine Rich and Kevin Knight – Artificial Intelligence, 2<sup>nd</sup> edition, Mc Graw Hill.
2. Nilson - Principles of Artificial Intelligence.
3. Winston - The psychology of Computer Vision, Mc. Graw Hill, 1975.
4. Winston - Common Lisp.
5. Clocksin & Mellish – Programming in PROLOG, 3<sup>rd</sup> Edition, Narosa Publication.

1. Introduction to Distributed Systems : Distributed Systems : Goals Hardware Concepts Software- design.
2. Communication in Distributed Systems : Layered Protocol - ATM Networks Client server model-remote procedure call- group communication.
3. Synchronization : Clock Synchronization – mutual Exclusion – election atomic transactions – dead locks.
4. Processes and Processors : Threads – system models processor allocation – Scheduling fault tolerance – real time distributed systems.
5. Distributed file systems: File System design and implementation – trends in distributed file systems.
6. Shared Memory : Introduction – bus based multi processors ring based multiprocessors switched multiprocessors – NUMA comparison of shard memory systems – consistency models – page based distributed shared memory – shared variable distributed shared memory – object based distributed shared memory.
7. Case Studies : MACH and CHORUS.

Text Book:

1. Andrew S. Tanenbaum – Distributed Operating System , Prentice Hall International Inc, 1995.

1. Features of Distributed Databases, Features of centralized databases, level of distributed Transparency – Reference Architecture, Types of Data Fragmentation, Distribution Transparency, Access primitives, Integrity constraints.
2. Distributed Database design - A frame work, the design of database fragmentation the allocation of Fragment. Translation of Global queries into Fragment queries, Query optimization.
3. Distributed Transaction Management – A framework, transaction atomicity, 2-Phase commit, Concurrency control: Foundations, distributed deadlocks, timestamps.
4. Reliability : Basic concepts, commit protocols, consistent view of Network, Detection and Resolution of Inconsistencies, check points and cold restart.
5. Commercial Systems : Tranclem's ENCOMPASS  
Distributed Database Systems, IBM's Inter system communication, features of distributed ingress and Oracle.
6. Heterogeneous databases : General problems – brief study of Multibase.

Text Book :

1. Ceri S, Pelagatti.G, Distributed Database Systems Principles and Systems, Mc. Graw Hill.

1. Geometry and line generation: Points, lines, planes, Co-ordinates, line segment, pixels and frame buffers. Bresenham's algorithms for line segment, Circle and character generation, stroke method, dot matrix method.
2. Graphic Primitives: Display devices, Display files, Display Processors, Graphic primitives point, move absolute move relative, line absolute, line relative, text primitives, display control primitives, line styles, programs using primitives, polygons representation, inside test, polygon filling.
3. 2D Transformations : Scaling, rotation, translation, homogeneous coordinates, rotation about arbitrary point, mirroring, shearing, Zooming, segment tables, segmented display files, operation on segments, data structures for display files.
4. Windowing and Clipping : Window, view port, viewing transformations. Clipping, polygon clipping, generalized clipping, multiple windowing.
5. Interaction : Interaction hardware-joy stick, tablet, light pen ,digitizer, input device handling, event handling, detectability attribute, echoing.
6. 3-D graphics II: 3-D primitives, 3-D transformations, projections – parallel, isometric , perspective, viewing parameters, viewing transformations.
7. 3 – D Graphics II : 3 –D clipping, hidden surface and line removal pointers algorithm, overlapping edges, shading algorithms.
8. Curves & Surfaces : Generation of curves & surfaces using Hermite, Beziere and B-Spline, sweep methods of interpolation, Generation of Solids, CSG modeling, X – Windows.

Text Books:

1. Vandom & Foley – Computer Graphics.
2. David F Rogers – Procedural Elements for Computer Graphics, Mc. Graw Hill.
3. Newman & Sproull – Principles of Interactive Computer Graphics, Mc. Graw Hill.
4. David F Rogers & Adams - Mathematical elements for Computer Graphics.