## MCSE- 201 (INFORMATION SECURITY, CODING AND CRYPTOGRAPHY)

**UNIT-I**

**Information Theory, Probability and Channel:** Introduction, Information Measures, Review probability theory, Random variables, Processes, Mutual Information, Entropy, Uncertainty, Shannon's theorem, redundancy, Huffman Coding, Discrete random Variable. Gaussian random variables, Bounds on tail probabilities.

**UNIT-II**

**Error Control Coding:** Channel Coding: Linear Block Codes: Introduction, Matrix description, Decoding, Equivalent codes, Parity check matrix, Syndrome decoding, Perfect codes Hamming Codes ,Optimal linear codes ,.Maximum distance separable (MDS) codes.

**UNIT-III**

**Cyclic Codes:** Introduction, generation, Polynomials, division algorithm, Matrix description of cyclic codes, burst error correction, Fire Codes, Golay Codes, and CRC Codes. BCH Codes: Introduction, Primitive elements, Minimal polynomials, Generator Polynomials in terms of Minimal Polynomials, Decoding of BCH codes.

**UNIT-IV**

**Coding for Secure Communications:** Review of Cryptography, Introduction, Encryption techniques and algorithms, DES, IDEA , RC Ciphers ,RSA Algorithm ,Diffi-Hellman, PGP, Chaos Functions, Cryptanalysis, Perfect security, Unicity distance, Diffusion and confusion, McElieceCryptosystem.

**UNIT-V**

**Advance Coding Techniques:** Reed-Solomon codes, space time codes, concatenated codes, turbo coding and LDPC codes (In details), Nested Codes, block (in Details), Convolutional channel. Coding: Introduction, Linear convolutional codes, Transfer function representation & distance properties, Decoding convolutional codes (Soft-decision MLSE, Hard-decision MLSE),

**References:**

1. Rajan Bose "Information Theory, Coding and Cryptography", TMH, 2002.

2. Kishor S. Trivedi "Probability and Statistics with Reliability, Queuing and Computer

   Science Applications", Wiley India, Second Edition.

3. J.C.Moreira, P.G. Farrell "Essentials of Error-Control Coding", Willey Student Edition

4. San Ling and Chaoping "Coding Theory: A first Course", Cambridge University Press,

   2004.

5. G A Jones J M Jones, "Information and Coding Theory", Springer Verlag, 2004.

6. Cole, "Network Security", Bible, Wiley INDIA, Second Addition

## MCSE-202 (ADVANCED COMPUTER ARCHITECTURE)

**UNIT-I**

Basic functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU - registers, instruction execution cycle, addressing modes, instruction set, Static interconnection networks, Dynamic interconnection Networks: Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks.

**UNIT-II**

Flynn's Classification, System Attributes to Performance, Parallel computer models - Multiprocessors and multicomputer, Multi-vector and SIMD Computers. Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, dataflow and Demand driven mechanisms.

**UNIT-III**

Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling - score boarding and Tomosulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines. Superscalar pipeline design, Super pipeline processor design.

**UNIT-IV**

Cache coherence, Snoopy protocols, Directory based protocols. Message routing schemes in multicomputer network, deadlock and virtual channel. Vector Processing Principles, Vector instruction types, Vector-access memory schemes. Vector supercomputer Architecture.

**UNIT- V**

**SIMD organization:** distributed memory model and shared memory model. Principle s of Multithreading: Multithreading Issues and Solutions, Multiple-Context Processors. Parallel Programming Mode ls: - Shared-Variable Model, Message-Passing Model, Data Parallel model.

**REFERENCES:**

1. KaiHwang, "Advanced computer architecture", TMH.

2. Hwang and Briggs, "Computer Architecture and ParallelProcessing"; MGH.

3. V.Rajaranam&C.S.R.Murthy, "Parallel computer"; PHI Learnin

4. J.P.Hayes, "computer Architecture and organization"; MGH.

## MCSE- 203 (SOFT COMPUTING)

**UNIT-I**

Introduction of soft computing, soft computing vs hard computing. Soft computing techniques. Computational Intelligence and applications, problem space and searching: Graph searching, differentsearching algorithms like breadth first search, depth first search techniques, heuristic searching Techniques like Best first Search, A* algorithm, AO* Algorithms. Game Playing**:** Minimax search procedure, adding alpha-beta cutoffs.

**UNIT-II**

**Fuzzy systems**: Introduction, Need, classical sets (crisp sets) and operations on classical sets Interval Arithmetic's ,Fuzzy set theory and operations, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Membership functions, Fuzzy rule base system

**UNIT-III**

**Neural Network:** Introduction, Biological neural network: Structure of a brain, learning methodologies. Artificial Neural Network(ANN): Evolution of, Basic neuron modeling , Difference between ANN and human brain, characteristics, McCulloch-Pitts neuron models, Learning (Supervised &Unsupervised) and activation function, Applications of Neural network.

**UNIT-IV**

**Unsupervised learning in Neural Network:** Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Associative memory, hope field network and Bidirectional associative memory. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Introduction to Support Vector machine, architecture and algorithms, Introduction to Kohanan's Self organization map, architecture and algorithms

**UNIT-V**

**Genetic algorithm:** Introduction, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, GA optimization problems.

**References:-**

1. S.N. Shivnandam, "Principle of soft computing", Wiley India.

2. David Poole, Alan Mackworth "Computational Intelligence: A logical Approach" Oxford.

3. Russell &Yuhui, "Computational Intelligence: Concepts to Implementations", Elsevier.

4. Eiben and Smith "Introduction to Evolutionary Computing" Springer

5. Janga Reddy Manne; "Swarm Intelligence and Evolutionary Computing"; Lap Lambert Academic Publishing

## MCSE-204 (CLOUD COMPUTING)

**UNIT-I**
**Introduction**: Historical development, Vision of Cloud Computing, Characteristics of cloud computing as per NIST, Cloud computing reference model, Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments.

**UNIT-II**
**Cloud Computing Architecture:** Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance, **Cloud Solutions:** Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management. **Cloud Offerings**: Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

**UNIT –III**
**Cloud Management & Virtualization Technology:** Resiliency, Provisioning, Asset management, Conceps of Map reduce, Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute ,storage, networking, desktop and application virtualization .Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements , Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits .

**UNIT-IV**
**Cloud Security:** Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture.

**UNIT-V**
Market Based Management of Clouds, Federated Clouds/Inter Cloud: Characterization & Definition, Cloud Federation Stack, Third Party Cloud Services. Case study: Google App Engine, Microsoft Azure, Hadoop, Amazon, Aneka

**Reference Books:**
1. Krutz, Vines, "Cloud Security ", Wiley Pub
2. Velte, "Cloud Computing- A Practical Approach" TMH Pub
3. Sosinsky, "Cloud Computing", Wiley Pub
4. Kumar Saurabh, "Cloud Computing", Wiley Pub

## MCSE-205 (ADVANCE DATA STRUCTURES AND ALGORITHMS)

**UNIT-I**
**Introduction:** Basic Terminology, Data types and its classification, Algorithm complexity notations like big Oh, Array Definition, Representation and Analysis of Arrays, Single and Multidimensional Arrays, Address calculation, Array as Parameters, Ordered List and operations, Sparse Matrices, Storage
Pools, Garbage collection.

**UNIT-II**
**Recursion: -** Recursion- definition and processes, simulating recursion, Backtracking, Recursive algorithms, Tail recursion, Removal of recursion. Tower of Hanoi Problem.
Linear Data Structure:- Stack, Array Implementation of stack, Linked Representation of Stack, Application of stack, Queue, Array and linked implementation of queues, Circular queues, D -queues and Priority Queues.

**UNIT-III**
Introduction of Linked list, Implementation of Singly Linked List, Two-way Header List, Doubly linked List, Linked List in Array. Generalized linked list, Non Linear Data Structure :-Trees: Basic terminology, Binary Trees, , algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Binary Search Tree(BST ) , Height-balanced and weight-balanced trees, B-trees, B+ -trees.

**UNIT-IV**
**Searching, Sorting and Design Techniques:**- Searching Techniques, Sorting-Internal Sorting, Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, Bin Sort, Radix Sort, External Sorting, Merge Sort, Multi-way Merge Sort ,Design Techniques -Divide and Conquer, Dynamic Programming, Greedy Algorithm, Backtracking, Local Search Algorithms.

**UNIT-V**
**Memory Management: -**Issues -Managing Equal Sized Blocks, Garbage Collection Algorithms for Equal Sized Blocks, Storage Allocation for Objects with Mixed Sizes, Buddy Systems, Garbage collection and compaction.

**Reference Books:**
1. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education P
2. Lipschutz; Data structure (Schaum); TMH
3. R. Kruse et al, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-
   2002