



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

MTCS-101 ADVANCED COMPUTER GRAPHICS & MULTIMEDIA

Unit 1

Basics of Computer Graphics, Graphics display devices, Input devices; Raster Graphics: line and circle drawing algorithms Windowing and clipping: Cohen and Sutherland line clipping. Cyrus beck clipping method.

Unit 2

Computations on polygons: point inclusion problem, polygon filling, polygon intersection, clipping. 2D and 3D Geometrical Transformations: scaling, translation, rotation, reflection.

Unit 3

Viewing Transformations, parallel and perspective projection, curves and Surfaces: cubic splines, Bezier curves B-splines, Hidden line/surface removal methods; Rendering & Visualization, Illuminations model. Shading: Gouraud, Phong. Introduction to Raytracing.

Unit 4

Multimedia Components, Multimedia system designs an introduction compression & decompression data & file format standard. Multimedia input/output technologies.

Storage technologies, Multimedia authoring & user interface. Hyper media massaging. Distributed multimedia system

Reference Books:

- Rogers D.F. Procedural Elements of Computer Graphics, McGraw Hill.
- Hearn and Baker. Computer Graphics, Prentice-Hall of India, New Delhi
- Foley, VanDam, Fundamentals of Interactive Computer Graphics, Addison Wesley
- Multimedia System Design- Prabhat K. andleigh and Kiran Thakrar, PHI
- Shuman, Multimedia in action, Cengage (Thomson)



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

MTCS-102 Information theory, coding and cryptography

Unit1.

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.2 Stochastic Processes: Statistical independence, Bernoulli Process, Poisson Process, Renewal Process, Random Incidence, Markov Modulated Bernoulli Process, Irreducible Finite Chains with Aperiodic States, Discrete-Time Birth-Death Processes, Markov property, Finite Markov Chains, Continuous time Markov chain, Hidden Markov Model.

Unit 3. 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. 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.4 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, McEliece Cryptosystem

Unit.5 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),The Viterbi algorithm for MLSE, Performance of convolutional code decoders, Soft & Hard decision decoding performance, Viterbi algorithm implementation issues: RSSE, trellis truncation, cost normalization, Sequential decoding: Stack, Fano, feedback decision decoding, Techniques for constructing more complex convolutional codes with both soft and hard decoding.

Text Books and 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
- 7.Proakis and Masoud, "Digital Communication" ,McGraw-Hill ,2008



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

MTCS-103 ADVANCED DATA STRUCTURES AND ALGORITHM

UNIT 1

INTRODUCTION: Basic concepts of OOPs – Templates – Algorithm Analysis – ADT - List (Singly, Doubly and Circular) Implementation - Array, Pointer, Cursor Implementation

UNIT 2

BASIC DATA STRUCTURES: Stacks and Queues – ADT, Implementation and Applications - Trees – General, Binary, Binary Search, Expression Search, AVL, Splay, B-Trees – Implementations - Tree Traversals.

UNIT 3

ADVANCED DATA STRUCTURES: Set – Implementation – Basic operations on set – Priority Queue – Implementation - Graphs – Directed Graphs – Shortest Path Problem - Undirected Graph - Spanning Trees – Graph Traversals

UNIT 4

MEMORY MANAGEMENT ; Issues - Managing Equal Sized Blocks - Garbage Collection Algorithms for Equal Sized Blocks - Storage Allocation for Objects with Mixed Sizes - Buddy Systems - Storage Compaction

UNIT 5

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, Polyphase Sorting - Design Techniques - Divide and Conquer - Dynamic Programming - Greedy Algorithm – Backtracking - Local Search Algorithms

Reference Books :

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson P
2. Aho, Hopcroft, Ullman, “Data Structures and Algorithms”, Pearson Education P
3. Drozdek, Data Structures and algorithm in Java, Cengage (Thomson)
4. Gilberg, Data structures Using C++, Cengage
3. Horowitz, Sahni, Rajasekaran, “Computer Algorithms”, Galgotia,
4. Tanenbaum A.S., Langram Y, Augestien M.J., ”Data Structures using C & C++”, Prentice Hall of India, 2002



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

MTCS-104 OBJECT ORIENTED TECHNOLOGY

UNIT 1

Overview of object oriented concepts: Need for object oriented programming, characterization of object oriented languages.

Unit 2

Object oriented Design : object structure concepts, methodology for object oriented design (Booch, and chen and chen), Design modelling, system design life cycle.

Unit 3

Object oriented programming : An overview of c++ programming, loops and decisions, structures and functions, objects and classes, Array and pointers, Inheritance, virtual function, files and stream.

Unit 4

Object oriented Databases : Relational v/s object oriented databases, The architecture of OO databases, Query languages for OO databases, Gemstone/O2/orion.

Unit 5

Distributed object oriented systems: Object management group, CORBA.

Reference Books :

1. Object Oriented Analysis and Design, Satzinger, Cengage(Thomson)
2. Object Oriented S/W Development by Mc. Gregor & Sykes DA, Van Nostrand.
2. OOP in C++ by Lafore, Galgotia Pub.
3. The C++ Programming Language by Stroustrup B, Addison Wesley
4. Introduction to OOP by Witt KV, Galgotia Pub.
5. Object Data Management by Cattel R., Addison Wesley
6. Modern Data Base System by Kim W, ACM Press, AddisonWesely
7. OOP by Blaschek G, Springer Verlag
8. An Introduction to Java Programming and OOAD, Johnson, Cengage



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

MTCS 105A Data Warehousing & Mining

Introduction : Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas.

Association Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search etc., Generalized association rules. Clustering paradigms; Partitioning algorithms like K-Medoid, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK, CACTUS.

Other DM techniques & Web Mining: Application of Neural Network, AI, Fuzzy logic and Genetic algorithm, Decision tree in DM. Web Mining, Web content mining, Web structure Mining, Web Usage Mining.

Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis.

Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends.

Data Mining of Image and Video : A case study. Image and Video representation techniques, feature extraction, motion analysis, content based image and video retrieval, clustering and association paradigm, knowledge discovery.

Reference Books :

1. Data Mining Techniques ; Arun K.Pujari ; University Press.
2. Data Mining; Adriaans & Zantinge; Pearson education.
3. Mastering Data Mining; Berry Linoff; Wiley.
4. Data Mining; Dunham; Pearson education.
5. Text Mining Applications, Konchandy, Cengage



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

MTCS 105B Simulation and Modeling

Introduction to modeling and simulation: Modeling and simulation methodology, system modeling , concept of simulation, continuous and discrete time simulation.

Basic concept of probability and random variables continuous and discrete random variables, distribution of random variables: discrete and continuous, Compartmental models: linear, nonlinear and stochastic models.

Introduction to Queuing Theory: Characteristics of queuing system, Poisson's formula, birth-death system, equilibrium of queuing system, analysis of M/M/1 queues. Application of queuing theory in computer system like operating systems, computer networks etc.

STELLA, POWERSIM.

Reference Books :

Gorden G., System simulation Printice Hall.Payer T., Introduction to system, System Dynamics modeling: Identification of problem situation , preparation of causal loop diagrams and flow diagrams, equation writing, level and rate relationship. Simulation of system dynamics models.

1. Verification and validation: Design of simulation experiments, validation of experimental models, testing and analysis. Simulation languages comparison and selection, study of Simulation sw -SIMULA, DYNAMO, simulation, McGraw Hill.
2. Seila, Applied Simulation Modeling, Cengage.
3. Spriet, Computer Aided Modeling and Simulation, W.I.A.
4. Sushil, System Dynamics, Wiley Eastern Ltd. 23.
5. Shannon R.E., System simulation, Prentice Hall.



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

MTCS 105C ADVANCED COMPUTER ARCHITECTURE

UNIT 1

Flynn's and Handler's Classification of parallel computing structures. Pipelined and Vector Processors.

UNIT 2

Data and control hazards and method to resolve them. SIMD multiprocessor structures. I

UNIT 3

Interconnection networks. Parallel Algorithms for array processors, Search algorithms, MIMD multiprocessor systems,

UNIT 4

Scheduling and load balancing in multiprocessor systems, Multiprocessing control and algorithms.

Reference Books:

1. Advance Computer Architecture, parthsarthy, Cengage (Thomson)
2. Computer Architecture and Organisation- John Hays, Mc.Graw-Hill.
3. Computer Architecture and Parallel Processing- Hwang And Briggs, TMH.