

## 5<sup>th</sup> Semester

### MCA - 701 COMPUTER GRAPHICS

#### **UNIT - I**

Graphic Systems : Refresh CRT, raster-scan displays, DVST, plasma displays, LCD, Input devices : functions provided by input devices, basic working of these input devices, image scanners, touch panels, Input modes, request mode, event mode.

#### **UNIT – II**

Output Primitives : Points, lines, DDA, Bresenham line & circle drawing algorithm, ellipse generation. Filled area Primitives : scan line polygon fill algorithm, inside outside tests, boundary fill algorithm. Line width, color, color and gray levels, character attributes.

#### **UNIT – III**

Two-dimensional Geometric Transformation: Basic transformation, translation, rotation, scaling, fixed point scaling, general scaling direction. The viewing pipeline, window-viewpoint transformation. Line clipping algorithms.

#### **UNIT – IV**

Three Dimensional concepts : Polygon surfaces, plane equation, curved lines and surfaces, quadric surfaces, spline representation, spline specification. Bezier curves and surfaces, B-splines and surfaces, Displaying spline curves and surfaces, Horner's rule.

#### **UNIT – V**

Three Dimensional transformation and viewing methods : 3 D transformations, viewing co-ordinates, transformation from world to viewing co-ordinates, parallel and perspective projections, Back face detection, depth-buffer and A-buffer methods.

#### **Text & Reference Books**

- 1) Computer Graphics by D.Hearn and M.P. Baker
- 2) Computer Graphics - A programming approach by Harriyton.
- 3) Procedural Elements of Computer Graphics by Roger.
- 4) Three Dimensional Computer Graphics by Folley and Dam

## **MCA 702 AI & EXPERT SYSTEM**

### **UNIT-I**

Introduction to AI various types of production system. Analysis of problem for developing an AI system. Problem characteristics, Production system and its characteristics. BFS, DFS, and Different heuristic search techniques- Hill climbing, Ascent Hill climbing, Constraint satisfaction. A\* algorithm AO\* Algorithm.

### **UNIT-II**

Knowledge Representation : Representation and mappings, Approaches to knowledge representation, Issue in knowledge representation, Knowledge representation using predicate logic resolution, and unification algorithm. Knowledge representation using rules procedural versus declarative knowledge logic programming, Forward and back ward reasoning .Symbolic reasoning under uncertainty monotonic and non monotonic reasoning. Semantic nets, Frames Conceptual dependency.

### **UNIT-III**

Natural language processing and study of its different phases, Game planning Minimax Search procedure, Adding Alpha Beta cut-offs, Iterative deepening Planning components of planning system Goal stack planning Nonlinear and Hierarchical planning.

### **UNIT-IV**

Statistical reasoning Probability and Bayes Theorem Certainty factor and rule base system Bayesian Networks Dempster Shafer Theory Fuzzy Logic. Understanding Parallel and distributed AI Psychological Modeling, Parallelism in reasoning system.

### **UNIT-V**

Introduction to learning, various learning techniques Introduction to Expert System . Connectionist Model Hopfield networks learning in Neural Networks Application Common Sense ontology's and Memory organizations

### **Text & Reference Books**

- 1) AI by Rich & Knight.
- 2) AI by Norwing.

## ELECTIVE – I

### **MCA - 711 DATA WARE HOUSING & DATA MINING**

#### **UNIT I**

Need for data warehouse, definition, goals of data warehouse, Data Mart, Data warehouse architecture, extract and load process, clean and transform data, star, snowflake and galaxy schemas for multidimensional databases, fact and dimension data, Designing fact tables. partitioning, partitioning strategy – horizontal partitioning, vertical partitioning,

#### **UNIT II**

Data warehouse and OLAP technology, multidimensional data models and different OLAP operations, OLAP Server: ROLAP, MOLAP and HOLAP. Data warehouse implementation, efficient computation of data cubes, processing of OLAP queries, indexing OLAP data.

#### **UNIT III**

Data preprocessing, data integration and transformation, data reduction, Discretization and concept Hierarchy Generation, Data mining primitives, Types of Data Mining, Data Mining query language, Architectures of data mining. data generation & Summarization based characterization, Analytical characterization, Mining class comparisons, Mining descriptive statistical measures in large data bases.

#### **UNIT IV**

Mining Association Rules in large databases: Association rule mining, single dimensional Bookan association rules from Transactional DBS, Multi level association rules from transaction DBS, multidimensional association rules from relational DBS and DWS, Correlation analysis, Constraint based association mining.

#### **UNIT V**

Classification and Prediction : Classification by decision tree induction, Back propagation, Bayesian classification, classification based in association rules, Prediction, classifier accuracy, Cluster analysis, partitioning and hierarchical methods, Density based methods Grid based methods, web mining, Temporal and spatial data mining.

#### **Text & Reference Books**

- 1) Building Data Ware House by W.H.Inmon, John Wiley & Sons
- 2) Data warehousing by S . Anahory and D.Murray, Pearson Education, ASIA
- 3) Data Mining Concepts & Techniques by Jiawei Han & Micheline Kamber; Harcourt India PVT Ltd.
- 4) TMH Oracle 8i Building Data Ware Housing by Michall Corey, M.Abbey, I Azramson & Ben Taub.
- 5) Data Mining, Practical Machine Cearing tools & techniques with Java by I.H. Whiffen (Morgan Kanffmen)
- 6) Data Ware Housing with oracle by Sima Yazdanri & Shirky S. Wong
- 7) Data Mining Techniques by A.K. Pujari , University Press.

## **ELECTIVE – II**

### **MCA 704 NEURAL NETWORKS AND FUZZY LOGIC**

#### **UNIT-I**

Introduction:- Models of Neuron, Neural Networks viewed as directed graph of feedback, network architectures, knowledge representation, applications of neural network. Learning Processes:- Error correction learning, memory based learning, Hebbian learning competitive learning, Boltzmann learning credit assignment problem, learning with teacher learning without a teacher, learning tasks.

#### **UNIT-II**

Memory Adaptation, Stochastic nature of learning process, stochastic learning theory probably approximately correct model of learning.

Single Layer Perceptrons:- Adaptive Filling problem, unconstrained optimization techniques, linear least square fillers, learn-mean-square algorithm, learning curves, learning rate annealing techniques.

Perceptron, perceptron convergence theorem relation between the perceptron and bayes classifier for gaussian environment.

#### **UNIT-III**

Multi-layer Perceptrons:- Some preliminaries, back-propagation algorithm, summary of back propagation algorithm, XOR problem, Heuristic for making the back propagation algorithm perform better.

Output representation and decision rule, Computer experiment, Feature detection, back-propagation and differentiation, Hessian matrix, generalization, approximation of functions virtues and limitations of back-propagation learning, accelerated convergence of back-propagation learning, connection networks regularization theory.

#### **UNIT-IV**

Supervised learning on Posed Hyper-surface reconstruction problem Cover's theorem on separability of patterns interpolation problem regularization network, generalized radial basis function networks, XOR problem. How to build a support vector machine, for pattern recognition.

#### **UNIT-V**

Supervised learning on Posed. Hyper-surface reconstruction problem. Cover's theorem on separability of patterns interpolation problem regularization network, generalized radial basis function networks, XOR problem. How to build a support vector machine, for pattern reorganization.

#### **Text & Reference Books**

- 1) Neural Network, Simon Haykin, Pearson Education Association.

## **MCA-705 WEB BASED APPLICATIONS DEVELOPMENT**

### **UNIT-I**

Object Oriented Programming with JAVA: Overview construction, this, Super, final, static, abstract classes, interfaces, overloading, overriding, virtual methods, reference manipulation, Applets, parameter passing to applet, Graphics programming, string, string buffer.

### **UNIT-II**

Packages: Java. AWT: table, buttons, list etc., Java.lang: Object class, Garbage collection, cloning, Reflection etc. Java.io: streams, File class, File I/O stream, Date I/O stream, Random & buffered access, java.net.

### **UNIT-III**

Java Database Connectivity : Two tier & three tier models, Types of Drivers : communicating with database, creating JDBC statements, creating and using statement objects, Result set, Database Meta Data, Result set Meta Data; Servlets: Servlet Architecture, Servlet interface, Servlet Request/ Response interface, Servlet designing, using cookies, session management, connection pooling, servlet & JDBC, JFC & Swing.

### **UNIT-IV**

Remote Method Invocation RMI: RMI Architecture, Stub, skeleton, Remote Reference Layer, Transport Layer, Writing RMI client/ server, RMI Registry, Call back Mechanism; JAVA Security: Language level security, JVM Level security and security API, Applet security, security manager.

### **UNIT-V**

Concepts of COM, DCOM, Active X, ORB, WAP, Bluetooth, Net technology.

### **Text & Reference Books**

- 1) Complete Reference JAVA2 By H.Schildt. TMH
- 2) Java Servlets By Phil Hanna, TMH
- 3) Java Thread Programming By Paul Hyde, SAMS
- 4) Java Virtual Machine By Tim Lindholm & Frank Yellin, Addison Wesley
- 5) Java Swing By Loy & Wood, O' reilly
- 6) Java Beans BY Monson & Haefel, O' reilly
- 7) JDBC IDG Publications
- 8) Java servlets By Korl Moss, TMH

### **MCA-741 COMPUTER GRAPHICS**

Viva-Voce shall be conducted on Computer Graphics. Assignment shall include Graphics programming which has to be implemented using C/C++.

### **MCA-742 ELECTIVE – I**

Viva-Voce shall be conducted on Data ware Housing and Mining.

### **MCA-743 PROGRAMMING LAB IN JAVA**

Students are required to do develop a small project using JAVA.

## **MCA - 711 DATA WARE HOUSING & DATA MINING**

### **UNIT I**

Need for data warehouse, definition, goals of data warehouse, Data Mart, Data warehouse architecture, extract and load process, clean and transform data, star, snowflake and galaxy schemas for multidimensional databases, fact and dimension data, Designing fact tables. partitioning, partitioning strategy – horizontal partitioning, vertical partitioning,

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- 2) Data warehousing by S . Anahory and D.Murray, Pearson Education, ASIA
- 3) Data Mining Concepts & Techniques by Jiawei Han & Micheline Kamber; Harcourt India PVT Ltd.
- 4) TMH Oracle 8i Building Data Ware Housing by Michall Corey, M.Abbey, I Azramson & Ben Taub.
- 5) Data Mining, Practical Machine Cearing tools & techniques with Java by I.H. Whiffen (Morgan Kanffmen)
- 6) Data Ware Housing with oracle by Sima Yazdanri & Shirky S. Wong
- 7) Data Mining Techniques by A.K. Pujari , University Press.

## **MCA 712 Mobile Computing**

### **UNIT I**

Introduction: Current Wireless Systems; Overview of Paging Systems, Cordless Phones, Cellular Telephone Systems, Satellite Communication, Wireless LANs, Blue tooth.

Modern Wireless Communication Systems, Wireless Networks and Standards, Wireless in Local loop & LMDS Cellular Concepts Frequency spectrum, frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, fundamentals of antennas, Equivalent circuit for antenna, Antennas as cell site, Mobile antennas, Analog Vs Digital, Spectrum regulation, Licensing methods.

### **UNIT II**

Cellular Networks: Mobile Radio Propagation, A basic cellular system, Performance criterion, Operations of Cellular Networks, Concept of frequency reuse Channels, Co channel Interference and its reduction factor, types of non co channel Interference, Desired C/I from normal case on omni directional antenna systems, Digital Modulation

### **UNIT III**

Multi Access Technique & Wireless Standards :TDD, FDD, Rake receiver, CDD, Spread spectrum, FDMA, TDMA, CDMA, Wireless Standards GSM, CDMA, DECT, UMTS & IMT-2000, **WAP** Model and architecture, Gateway, Protocol stack, Wireless Application environment

### **UNIT IV**

Wireless LAN:IEEE 802.11 Concepts, MAC Layer, Spread Spectrum Wireless LAN, Infrared Wireless LANs, Other Physical Layer Protocol (IEEE 802.11b, IEEE 802.11a), Wireless PAN (Blue tooth), HIPERLAN, Mobile Network Layer (Mobile IP), Mobile Transport Layer (Mobile TCP), Mobile Data network (GPRS),

### **UNIT V**

GSM Systems Overview: Architecture, Location tracking, and call setup. Security, Data Services N/W Signaling, GSM mobility management, Operations, Administration and maintenance. GSM bearer Services: SMS architecture-Protocol Hierarchy, DTE-DCE interface, Mobile prepaid phone services.

### **Text & Reference Books**

- 1) Wireless communication, T. S. Rappaport, PHI
- 2) Wireless and Mobile Network Architecture : Yi-Bing Lin, Wiley.
- 3) Mobile Communications, J. Schiller, Pearson Education



## MCA 713 ADVANCED RDBMS

### **UNIT I**

The Extended Entity Relationship Model and Object Model: The ER model revisited, Motivation for complex data types, User defined abstract data types and structured types, Object-Oriented Databases: Overview of Object-Oriented concepts, Object identity, Object structure, and type constructors, Encapsulation of operations, Methods, and Persistence, Type hierarchies and Inheritance, Type extents and queries, Complex objects; Database schema design for OODBMS; OQL, Persistent programming languages; OODBMS architecture and storage issues; Transactions and Concurrency control, Example of ODBMS

### **UNIT II**

Object Relational and Extended Relational Databases: Database design for an ORDBMS - Nested relations and collections; Storage and access methods, Query processing and Optimization; Advance Querying and Information Retrieval Decision Support Systems, Information Retrieval Systems Data Analysis and OLAP, Data Mining.

### **UNIT III**

Parallel and Distributed Databases and Client-Server Architecture: Architectures for parallel databases, Parallel query evaluation; Parallelizing individual operations, Sorting, Joins; Distributed database concepts, Data fragmentation, Replication, and allocation techniques for distributed database design; Query processing in distributed databases; Concurrency control and Recovery in distributed databases

### **UNIT IV**

Databases on the Web and Semi Structured Data: Web interfaces to the Web, Overview of XML; Structure of XML data, Document schema, Querying XML data; Storage of XML data, XML applications; The semi structured data model, Implementation issues, Indexes for text. Enhanced Data Models for Advanced Applications: Active database concepts. Temporal database concepts.; Spatial databases, Concepts and architecture; Deductive databases and Query processing; Mobile databases, Geographic information systems, MultiMedia databases.

### **UNIT V**

Advance Transaction Processing Systems : Transaction Processing Monitor, Transaction Work flows , Main Memory Databases, Real Time Transaction Systems, Long Duration Transactions Transaction Management in Multi Databases Case Studies Oracle, Microsoft SQL Server

### **Text & Reference Books:**

- 1) Elmasri and Navathe, Fundamentals of Database Systems, Pearson Education
- 2) Korth, Silberchatz, Sudarshan , Database System Concepts, McGraw-Hill.
- 3) C.J.Date, Longman, Introduction To Database Systems, Pearson Education.

## **MCA 714 DISTRIBUTED SYSTEMS**

### **UNIT I**

Introduction: Motivation, objectives, characterization & classification of distributed systems. Distributed system architecture. Hardware & software issues. Communication: Layered protocols, Client server protocols, RPC, group communication. Coordination, synchronization & consistency: Logical clocks, Physical clocks, mutual exclusion, election algorithms, atomic broadcast, sequential consistency transaction distributed consensus, Threads: Thread synchronization, implementation issues, threads vs. RPC.

### **UNIT II**

Models of distributed computing: client server and RPC, RPC architecture, exceptions, underlying protocols, IDL, marshalling. Group models and peer to peer: Groups for service replication/ reliability, groups for parallelism / performance, client/ server vs. peer-to-peer, multicast, atomic broadcast

### **UNIT III**

Distributed file system: security, Naming/ location transparency, R/W semantics, cache coherence, replication. Distributed shared memory: DSM architecture, consistency models and relation to caching, release consistency, comparison with message passing and RPC.

### **UNIT IV**

Fault tolerant distributed systems: Introduction, dependability, faults vs. errors vs. failure, space time and value redundancy, fault tolerant architecture, failure detection algorithms, partitioning, FT consensus. Distributed multimedia system: Introduction, characteristics, and resource management stream adaptation.

### **UNIT V**

Security: introduction, security techniques, cryptographic algorithms, authentication and access control. Case study: CORBA, MACH

### **Text Books & References:**

- 1) Distributed systems, concepts and design, 3rd Edition, Addison Wesley by George Colouris, Jean Dollimore and Tim Kinder berg.
- 2) Distributed system, 2nd Edition, Addison Wesley by Sape Mull ender.

## MCA 715 NATURAL LANGUAGE PROCESSING

### **UNIT I**

Introduction to Natural Language Processing: Linguistic Background, Words, Simple Noun Phrases, Verb and Adjective Phrases, Grammar and Parsing, Top-Down Parser, Bottom-Up Parser, Features and Augmented Grammars.

### **UNIT II**

Grammars For Natural Language: Efficient Parsing, Shift-Reduce Parsing, Deterministic Parser, Partial Parsing, Ambiguity Resolution: Statistical Methods, Parts-Of-Speech Tagging ,Best-First Parsing.

### **UNIT III**

Semantic and Logical Forms: Word Senses and Ambiguity, Linking Syntax and Semantics, Ambiguity Resolution.

### **UNIT IV**

Semantic Interpretation: Scope and Interpretation of Noun Phrases, Knowledge Interpretation and Reasoning.

### **UNIT V**

Local Discourse Context and Reference: Discourse Structure, Using World Knowledge, Matching Against Expectations, Reference and Matching Expectations Using Knowledge About Action and Causality.

### **Text Books & References:**

- 1) Natural Language Understanding James Allen 2<sup>nd</sup> Edition Pearson Education

## MCA 721 PATTERN RECOGNITION & COMPUTER VISION

### **UNIT I**

Introduction to pattern recognition, types of images, regular pattern, irregular pattern, fuzzy methods. Statistical pattern recognition, feature selection, syntactic pattern recognition, clustering and non supervised learning methods.

### **UNIT II**

Combined detection method, edge detection, edge linking, gradient. Laplacian, line detection, method based, point detection, snake methods. Boundary description detection, matching, merging segmentation, smoothing, splitting of boundaries syntactic, analysis of region boundaries, study of shape by region analysis.

### **UNIT III**

Explanation of how fuzzy approach can be applied to pattern recognition, classificatory analysis preprocessing, feature detection and primitive extraction, adaptive classification of fuzzy grammar. Algorithms for pattern recognition, neural network fundamentals, approaches for pattern recognition.

### **UNIT IV**

Introduction of Computer Vision ,Computer Imaging System, Image Formation and sensing CVIP tools Software , Image representation. Area Extraction: Concepts, Data-structures, Edge, Line-Linking, Hough transform, Line fitting, Curve fitting .

### **UNIT V**

Region Analysis: Region properties, External points, Spatial moments, Mixed spatial gray-level moments, Boundary analysis: Signature properties, Shape numbers. General Frame Works For Matching: Distance relational approach, Ordered- structural matching, View class matching, Models database organization. Knowledge Based Vision: Knowledge representation, Control-strategies, Information integration.

### **Text Book & References:**

- 1) Duda, Hart, and Stock, *Pattern Classification*, John Wiley and Sons.
- 2) Gose, Johnsonbaugh and Jost, *Pattern Recognition and Image analysis*, PHI
- 3) Milan Sonka, Vaclav Hlavac, Roger Boyle, *Image Processing, Analysis,*  
*and*  
*Machine Vision* Thomson Learning
- 4) Robert Haralick and Linda Shapiro, *Computer and Robot Vision*, Vol I, II, Addison-Wesley, 1993.

## MCA 722 MULTIMEDIA COMPUTING

### UNIT I

Introduction to multimedia, system architecture & technologies , Objects for multimedia systems , Multimedia interface standards , data and file format standards RTF, TIFF , RIFF , MIDI , JPEG , MPEG. MP3 Authoring Tools.

### UNIT II

Need for data compression, lossy and lossless compression, Binary Image Compression techniques, Video Image compression , Full motion video compression , audio compression. Animation and its Basics, Software for Animation, Animation Techniques – Concept of Key Frame, Tracing and Path, 2D Tweaking, Morphing, Color Cycling, Walk Cycle Wrap, Rotation, 3D Animation Techniques : Lofting, Lighting Revolving Inverse Kinematics Morphing Key Framing

### UNIT III

Multimedia input and output technologies, Pen input, video and image display systems, image scanners , Print output technologies. Digital voice and audio, Digital camera, hardware for video images and animation, Full motion video hardware. Storage and retrieval technologies. Digital Sound Capturing And Editing Tools  
Sampling of Sound, Frequency, Sound Depth, Channels in Sound and Third Effects on Quality and Storage Size Estimation of Space of a Sound File, Sound Card Standard – Fm Synthesis Cards, Waves Table Cards

### UNIT IV

Speech recognition and generation Telecommunications considerations for Multimedia, Specialized processors , Memory systems, LAN/WAN connectivity , Network performance parameters , Multimedia communication protocols (UDP , RTP , RTCP , XTP , TELNET , IP Multicast etc) .

### UNIT V

Multimedia authoring systems and tools, Multimedia Applications and Design issues, VRML(Virtual reality modeling language), Streaming, Hypermedia application design considerations , User interface design , Hypermedia message , Integrated Multimedia message standards .

### **Text Books & References:**

- 1) Multimedia system Design by Prabhat K Andleigh and Kiran Thakrar(PHI Publications).
- 2) Multimedia Communications by Fred Halsall(Pearson Publications).
- 3) Multimedia: Computing , communications and applications by Ralf Steinmetz and Kalra Nahrstedt (Pearson Publications).
- 4) Multimedia Making it work (4<sup>th</sup> Edition)-by Vaughan TataMcgraw Hill

## **MCA 723 PARALLEL COMPUTING**

### **UNIT I**

Introduction to parallel processing and pipelining, array computers, multiprocessor systems, dataflow diagrams and applications of parallel processors.

### **UNIT II**

Various types of pipeline processors like arithmetic pipelines, instruction pipelines etc., reservation table, design of various types of pipelines, instruction pre-fetching and branch handling in pipelines, data buffering and busing structures in pipelines. Vector supercomputers.

### **UNIT III**

Structures and Algorithms for Array Processors: Meaning of instruction streams and data streams, classification of computers based on these as SISD, SIMD, MISD and MIMD, SIMD computer organization, various types of SIMD interconnected networks like static and dynamic networks, mesh-connected, networks, cube connected networks etc., SIMD matrix multiplication and parallel sorting algorithms.

### **UNIT IV**

Multiprocessors :Introduction, Architecture, Fault-tolerant computers. Various types of array and associative processors, loosely and tightly coupled microprocessors, various types of interconnection networks like time shared or common bus, crossbar switch, multi-port memories etc.

### **UNIT V**

Control flow and data flow computers, data flow computers, data flow graphs and languages, static and dynamic data flow computers, systolic array architecture.

### **Text Book & References:**

- 1) Kai Hwang: Computer Architecture and Parallel Processing: Tata McGraw Hill
- 2) John P. Hayes Computer Architecture and Organization: Tata McGraw Hill
- 3) Andrew S: Tanenbaum, Modern Operating Systems, 2nd Edition, Prentice Hall, 2001.

## **MCA 724 ADVANCED COMPUTER ARCHITECTURE**

### **UNIT I**

Overview of Modern Processor Architectures. Theory of Parallelism : Evolution of Computer Architectures, Multiprocessors and Multicomputers. Multivector and SIMD computers ,PRAM and VLSI models, Condition of Parallelism , program partitioning and scheduling.

### **UNIT II**

Program flow mechanism, System interconnect architecture, Performance metrics and measures : Efficiency, utilization and quality. Standard Performance Measures. Parallel processing Applications, Speedup Performance laws.  
Bus Architecture Implementations of shared memory, cache memory organization.

### **UNIT III**

Replicated Architectures: SIMD/MIMD, Shared Memory and Distributed Memory RISC, CISC Scalar processors, super Scalar and VLIW Computers, Multi-vector Computers, Connectivity Interconnection networks: topology, routing, flow control, deadlock avoidance, static and dynamic interconnection networks.

### **UNIT IV**

Vector Pipeline Architectures Pipelined CPU architecture. Instruction set design and pipeline structure, instruction Pipeline Design, Nonlinear Pipelining Processors, Arithmetic pipeline design, Super scalar and Super pipeline design.

### **UNIT V**

Parallel and Scalable Architectures: Multiprocessors system Interconnects Cache Coherence and Synchronization Mechanism Scalable, Multi Threaded and Data Flow Architecture.

Text Book & References:

- 1) Kai Hwang: Advanced Computer Architecture: Tata McGraw Hill
- 2) Andrew S: Tanenbaum, Modern Operating Systems, 2nd Edition, Prentice Hall, 2001.
- 3) John Hennessy and David Patterson, Computer organization and Design: The hardware/Software interface, 2nd Edition, Morgan Kaufman Publishers.
- 4) John P. Hayes Computer Architecture & Organization: Tata McGraw Hill

## MCA 725 IMAGE PROCESSING

### **UNIT I**

Introduction to Image Processing Systems, Digital Image Fundamentals:- Image model, Relationship between Pixels, Imaging geometry, Camera model.

Manipulation on Images:- Images transformation : Introduction to FT, DFT and FFT. Walsh transformation, Hadamard transformation, Hostelling transformation, Histogram.

### **UNIT II**

Image Smoothing: - Neighborhood Averaging, Median Filtering, Low Pass Filters, Average of Multiple Images, Image Sharpening by Differentiation Technique, High Pass filtering. Image Restoration: - Degradation models for continuous function, effect of diagonalization, on-degradation, algebraic approach to restoration, interactive restoration, Gray level interpolation.

### **UNIT III**

Image Encoding and Segmentation: - Encoding, Mapping, Quantizer and Coder.

Segmentation: - Detection of discontinuation by point detection, line detection, edge detection. Edge linking and boundary detection:- Local analysis, global by graph, theoretic techniques. Thresh-holding: - definition, global thresh-holding.

### **UNIT IV**

Filtering:- median, gradient, simple method of representation signatures, boundary segments, skeleton of region.

### **UNIT V**

Mathematical Preliminaries : Random signals, Discrete Random fields , Spectral density function , Review of Estimation theory ,Review of information theory , Image Representation by Stochastic models : One dimensional Causal models , Levinson Algorithm.

### **Text Book & References:**

- 1) Digital Image Processing by Gonzalez & Wood , PHI.
- 2) Digital Image Processing by A.K.Jain.



## **MCA 726   NEURAL NETWORKS AND FUZZY LOGIC**

### **UNIT I**

Introduction:- Models of Neuron, Neural Networks viewed as directed graph of Feedback, network architectures, knowledge representation, applications of neural network. Learning Processes:- Error correction learning, memory based learning, Hebbian learning competitive learning, Boltzmann learning credit assignment problem , learning with teacher learning without a teacher, learning tasks.

### **UNIT II**

Memory Adaptation, Stastical nature of learning process, stastical learning theory probably approximately correct model of learning. Single Layer Perceptron: Adaptive Filtering problem, unconstrained optimization techniques, linear least square fillers, least-mean-square algorithm, learning curves, learning rate an healing techniques. Perceptron, perceptron convergence theorem relation between the perceptron and bayes classifier for gaussian environment.

### **UNIT III**

Multi-layer Perceptrons Some preliminaries, back-propagation algorithm, summary of back propagation algorithm, XOR problem, Heuristic for making the back propagation algorithm perform better. Output representation and decision rule, Computer experiment, Geature detection, back-propagation and differentiation, Hessian matrix, generalization, approximation of functions virtues and limitations of back-propagation learning, accelerated convergence of back-propagation learning, converction networks regularization theory.

### **UNIT IV**

Supervised learning on Ill Posed Hypersurface reconstruction problem Cover's theorem on separability of patterns interpolation problem regularization network, generalized radial basis function networks, XOR problem. How to build a support vector machine, for pattern recognition.

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