MCA 501 Computer Security

Module I

Module II

Module III

Module IV

Module V
Hardware Solutions: Cryptographic Accelerator, Authentication Tokens, Smart Cards, Biometrics, Digital cash, Secret sharing schemes, Zero-knowledge techniques, Folklore, Secret Sharing, Interactive proof

References
- Tanenbaum, A.S., Computer Networks, 4th edition, Prentice Hall,

Online resources
MCA 502 INTERNET TECHNOLOGY AND DISTRIBUTED APPLICATIONS

Module I

Module II
Private Networks, Virtual Private Network and Network Address Translation(NAT).

Module III
UDP: Process to Process Communication, User Datagram and Header format, UDP operation, Use of UDP.
TCP:- TCP Services, TCP features, TCP Segment Header, TCP Connection management, TCP State Transition Diagram, Flow Control, Error Control, Silly Window Syndrome, TCP Congestion control, TCP timer management.

Module IV
Domain Name System(DNS) :- Name space, Domain name space, Distribution of name space, DNS in the Internet, Resolution, DNS messages, Types of Records, Compression, DDNS.
TELNET:- Concept, Network Virtual Terminal, Embedding.
File Transfer Protocol(FTP):- Connections, communication, File Transfer, Anonymous FTP.
Trivial File Transfer Protocol (TFTP): Messages, Connection, Data Transfer.
HTTP:- Transactions, Request messages, Response message, Headers, Some other features.
WAP – Architecture, protocol stack and features.

Module V
Multimedia:- Digitizing Audio and Video, Audio and Video compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real –Time interactive Audio/Video- Real Time Transport Protocol (RTP), Real Time Transport Control Protocol (RTCP), Video On Demand, Voice Over IP.

References
MCA 503 COMPUTER GRAPHICS

(All the Graphics techniques specified should be implemented using OpenGL)

Module I

Module II
Transformations: Basic 2D transformations - Reflection, Shear, Composite Transformations. Window to viewport transformation-changing coordinate systems- Surface normal-Plane equation. Modeling a 3D object – Data structure for object representation

Module III
Projection: 3D Geometric transformations- Translation, Scaling, Rotation. Perspective parallel Matrix representation – 3D viewing – 3D clipping

Module IV
Representations of 3D Objects: Representation of curves and surfaces –Parametric, Quadric-Bezier, B-Splines, NURBS. Representing surfaces using polygon meshes- Sweep representations, Boundary representations, Spatial-partitioning representations, Constructive solid geometry.

Module V

References
- Foley J.D. , Andries van Dam, Computer Graphics(latest) - Principles and Practice, , Addison-Wesley.
MCA 504 DATA MINING

Module I - Introduction to Data mining & Date Warehouse
What is Data mining, Data mining -On What kinds of Data, Data mining Functionalities, Classification of Data mining Systems, Data Mining Task Primitives, Integration of Data mining systems, Major issues of Data mining, What is Data Warehouse, Multidimensional Data Model, A three-tier Data Warehousing Architecture.

Module II–Data Preprocessing and Mining Frequent Patterns
Data Preprocessing
Data Cleaning, Data Integration and Transformation, Data Reduction, Data discretization and concept hierarchy generation.

Association Rules
Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods : Apriori Algorithm, Generating association Rules from Frequent Item sets, Improving the Efficiency of Apriori. Mining Frequent item-sets without Candidate Generation.

Module III-Classification and Prediction
Introduction to Classification and Prediction, Issues Regarding Classification and Prediction
Classification by Decision Tree Induction: Decision Tree induction, Attribute Selection Measures, Tree Pruning, Bayesian Classification: Bayes’ theorem, Naïve Bayesian Classification, Rule Based Algorithms: Using If - Then rules of Classification, Rule Extraction from a Decision Tree, Rule Induction Using a Sequential Covering algorithm, K- Nearest Neighbour Classifiers.
Prediction : Linear Regression, Nonlinear Regression, Other Regression-Based Methods

Module IV - Clustering

Module V-Applications and Trends in Data Mining
Data Mining Applications : Data Mining for Financial Data Analysis, Data Mining for the Retail Industry, Data Mining for the Telecommunication Industry, Data Mining for Biological Data Analysis, Data Mining in Other Scientific Applications, Data Mining for Intrusion Detection, Social Impacts of Data Mining, Trends in Data Mining.

References
• Data Mining Concepts and Techniques – Jiawei Han and Micheline Kamber, Second Edition, Elsevier, 2006
• Data Warehousing, Data Mining, & OLAP – Alex Berson, Stephen J Smith, Tata McGraw Hill, 2004
• Data Warehousing, Sinha, Thomson Learning , First Edn.
MCA 506 COMPUTER GRAPHICS Lab (using OpenGL)

Lab directives
OpenGL libraries-installation in your computer-getting familiar with openGL commands-
Running simple programs downloaded from the site specified in the reference books or Official guide

Display drawing primitives – Draw Polygon surfaces, filling with colors–shading, scale, rotate
and translate a triangle with 3 colors at 3 vertices. Animate the triangle. Draw a circle and an
ellipse. Draw a cuboid with different colors on its sides. Implement projections using the cuboid.

Draw a sphere model with constant color. Draw a cone scale rotate and translate it. Animate two
objects on same screen.
Simulate solar system. Display Bazier and B-Spline surfaces. Implement Constructive solid
geometry techniques. Display a scene with and without back face culling.

MCA 505 (1) USER INTERFACE DESIGN

Module I

Introduction
Introduction-Importance-Human-Computer interface-characteristics of graphics
interface-Direct manipulation graphical system - web user interface-popularity-characteristic &
principles

Module II

Human Computer Interaction
User interface design process- obstacles-usability-human characteristics in design -
Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic
business functions-Design standards-system timings - Human consideration in screen design -
structures of menus - functions of menus-contents of menu-formatting -phrasing the menu -
selecting menu choice-navigating menus-graphical menus.

Module III

Windows
Windows: Characteristics-components-presentation styles-types-managements-
organizations-operations-web systems-device-based controls: characteristics-Screen -based
controls: operate control - text boxes-selection control-combination control-custom control-
presentation control.

Module IV

Multimedia
Text for web pages - effective feedback-guidance & assistance- Internationalization-
accessibility-Icons-Image-Multimedia -coloring.
Module V
Windows Layout - Test

References


MCA 505(2) BIOINFORMATICS

Module I

Module II
Fundamentals of Bioinformatics: Definition- Bioinformatics in industrial applications- Importance of Bioinformatics- Advantages and breakthroughs of HGP, Ethical Issues related to Human Genome Project, Genomics, Gene prediction in Prokaryotes and Eukaryotes, ORF prediction Proteomics levels of protein structure: primary, secondary, Tertiary and quaternary structures, Structure Prediction Tools, Molecular Visualization-Rasmol & SPDBV

Module III
Biological Databases: Biological Databases: Nature and diversity of data, classification and importance of Biological Databases, Nucleic Acid databases-Primary Sequence Databases and secondary sequence Databases, NCBI, Protein databases-sequence databases and structural databases

Module IV
Biological sequence Analysis: Concept of sequence Alignment, Scoring matrices: PAM & Blosum, Alignment of Pairs of sequences: Dot Plot; Alignment Algorithms-Needleman and Wunsch Algorithm, Smith Waterman Algorithm, Search for Homologous sequences using BLAST & FASTA programs
Multiple Sequence Alignment: Dynamic Programming and progressive alignment.
Tools: ClustalW, Concept of Molecular Phylogeny, Phylip

Module V

**Advances in Bioinformatics:** Microarray based technique – Analysis of gene expression, DNA Fingerprinting & DNA Foot printing, SNP Maps in population studies. Chemoinformatics, Pharmacogenomics, Personalized Medicine and ethical issues in Pharmacogenomics

References

- The Cell – A Molecular Approach, Geoffrey M. Cooper, Robert E. Hausman
  Cell & Molecular Biology Gerald Karp
- Bioinformatics : Sequence & Genome Analysis, David W Mount
- Fundamental Concepts of Bioinformatics, Dan E Krane, Michael L Raymer
- Introduction to Bioinformatics – Sunderarajan & Balaji
- Microarray Bioinformatics- Dav Stakel
- Bioinformatics Concepts Skills & Applications,Rastogi Sc, Namita Mendiratta, Parag Rastogi
- Pharmacogenomics in Drug Discovery and Development, Yan and Qing

**MCA 505(3) Digital Image Processing**

**Module I (DIGITAL IMAGE FUNDAMENTALS )**
Elements of digital image processing systems, Elements of visual perception, psycho visual model, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals -RGB,HSI models, Image acquisition and sampling, Quantization, Image file formats, Two-dimensional convolution, correlation, and frequency responses.

**Module II (IMAGE TRANSFORMS )**
1D DFT, 2D transforms – DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Radon, and Wavelet Transform.

**Module III (IMAGE ENHANCEMENT AND RESTORATION )**

**Module IV (IMAGE SEGMENTATION AND RECOGNITION)**
Edge detection. Image segmentation by region growing, region splitting and merging, edge linking, Morphological operators: dilation, erosion, opening, and closing. Image
Recognition – Patterns and pattern classes, matching by minimum distance classifier, Statistical Classifier. Matching by correlation, Neural network application for image recognition.

Module V (IMAGE COMPRESSION)
Need for image compression, Huffman, Run Length Encoding, Arithmetic coding, Vector Quantization, Block Truncation Coding. Transform Coding – DCT and Wavelet. Image compression standards.

References
- Lim, J.S., ‘Two Dimensional Signal and Image Processing’, Prentice-Hall.
Module V Issues in Cloud Computing

Issues in cloud computing, Implementing real time application over cloud platform
Issues in Intercloud environments, QOS Issues in Cloud, Dependability, data migration,
streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment.
in Cloud

References

- The Grid: Blueprint for a New Computing Infrastructure (2nd edition) by Ian Foster (Editor), Carl Kesselman (Editor) Publisher: Morgan Kaufmann, 2nd edition
- Enterprise Cloud Computing by Gautam Shroff, Cambridge
- Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India
- Grid Computing: Making the Global Infrastructure a Reality by Fran Berman (Editor), Geoffrey Fox (Editor), Tony Hey (Editor) Publisher: John Wiley & Sons, (April 8, 2003) ISBN: 0-470-85319-0.
- Cloud Computing for Dummies by Judith Hurwitz, R. Bloor, M. Kanfman, F. Halper (Wiley India Edition)

MCA 505(5) XML and Web Services

Module I XML Technology Family


Module II Architecting Web Services


Module III Web Services Building Blocks

Module IV Implementing XML in E–Business


Module V XML Content Management and Security


References

- Ron Schmelzer and Travis Vandersypen, “XML and Web Services unleashed”, Pearson Education
- Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education
- David Chappell, “Understanding .NET A Tutorial and Analysis”, Addison Wesley
- Kennard Scibner and Mark C. Stiver, “Understanding SOAP”, SAMS Publishing

MCA 505(6) Distributed Computing

Module I
Introduction to distributed systems – definition, goals, types. Architectures- System architectures, architectures versus middle ware, self management. Processes – Threads, Virtualisation, Clients, Servers, Code Migration

Module II

Module III
Consistency and replication – Data centric consistency, client centric consistency, consistency protocols. Fault Tolerance – introduction, process resilience, reliable client-server communication, reliable group communication, distributed commit.

Module IV
Security – Threats, cryptography, Secure Channels, access control mechanisms, security management

Module V
References

- Elements of Distributed Computing, Garg, Wiley Publications
- Distributed Operating System, Pradeep K Sinha, PHI Publications

MCA 505(7) EMBEDDED SYSTEMS

Module I  Introduction
Examples of Embedded systems, Major Application areas, Hardware fundamentals.

Module II Hardware and Software
Advanced hardware details, Interrupts, Software Architectures, Embedded Development Environment.

Module III Operating System
Introduction to Real Time Operating Systems, Operating System services, Basic design using a Real Time Operating System.

Module IV Tools
Embedded Software Development Tools, Debugging Tools and Techniques.

Module V Embedded Microcontrollers
Introduction, Programming Microcontrollers, Microcontroller Hardware and I/O.

References