

MCADD 801 - Soft Computing

UNIT-I

Introduction, Soft Computing concept explanation, brief description of separate theories.

Neural Networks and Probabilistic Reasoning; Biological and artificial neuron, neural networks and their classification. Adaline, Perceptron, Madaline and BP (Back Propagation) neural networks. Adaptive feed forward multilayer networks. Algorithms: Marchand, Upstart, Cascade correlation, Tilling. RBF and RCE neural networks. Topologic organized neural network, competitive learning, Kohonen maps.

UNIT-II

CPN , LVQ, ART, SDM and Neocognitron neural networks. Neural networks as associative memories (Hopfield, BAM). Solving optimization problems using neural networks. Stochastic neural networks, Boltzmann machine.

UNIT-III

Fundamentals of fuzzy sets and fuzzy logic theory, fuzzy inference principle. Examples of use of fuzzy logic in control of real-world systems.

UNIT-IV

Fundamentals of genetic programming, examples of its using in practice. Genetic Algorithms Applications of GA's – Class.

UNIT-V

Fundamentals of rough sets and chaos theory. Hybrid approaches (neural networks, fuzzy logic, genetic algorithms, rough sets).

BOOKS

1. Cordón, O., Herrera, F., Hoffman, F., Magdalena, L.: Genetic Fuzzy systems, World Scientific Publishing Co. Pte. Ltd., 2001, ISBN 981-02-4016-3
 2. Kecman, V.: Learning and Soft Computing, The MIT Press, 2001, ISBN 0-262-11255-8
 3. Mehrotra, K., Mohan, C., K., Ranka, S.: Elements of Artificial Neural Networks, The MIT Press, 1997, ISBN 0-262-13328-8
 4. Munakata, T.: Fundamentals of the New Artificial Intelligence, Springer-Verlag New York, Inc., 1998. ISBN 0-387-98302-3
 5. Goldberg : Introduction to Genetic Algorithms
 6. Jang, “ Nero-Fuzzy & Soft Computing”, Pearsons
- Note : Paper is to be set unit wise with internal choice.

MCADD 802 Distributed Systems

UNIT-I

Introduction to Distributed Systems : Goals of Distributed Systems, Hardware and Software concepts, the client server model, Remote procedure call, remote object invocation, message and stream oriented communications.

UNIT-II

Process and synchronization in Distributed Systems : Threads, clients, servers, code migration, clock synchronization, mutual exclusion, Bully and Ring Algorithm, Distributed transactions.

UNIT-III

Consistency, Replication, fault tolerance and security: Object replication, Data centric consistency model, client-centric consistency models, Introduction to fault tolerance, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.

UNIT-IV

Distributed Object Based and File Systems : CORBA, Distributed COM, Goals and Design Issues of Distributed file system, types of distributed file system, sun network file system,.

UNIT-V

Distributed shared memory, DSM servers, shared memory consistency model, distributed document based systems : the world wide web, distributed co-ordination based systems: JINI Implementation: JAVA RMI, OLE, ActiveX, Orbix, Visbrokes, Object oriented programming with SOM

BOOKS

1. Andrew S. Tanenbaum, Maarten Van Steen “Distributed Systems Principles and Paradigms” Pearson Education Inc. 2002.
2. Lui “Distributed Computing Principles and Applications”.
3. Harry Singh “Progressing to Distributed Multiprocessing” Prentice-Hall Inc.
4. B.W. Lampson “Distributed Systems Architecture Design & Implementation”, 1985 Springer Verlag.
5. Parker Y. Verjies J. P. “Distributed computing Systems, Synchronization, control & Communications” PHI.
6. Robert J. & Thieranf “Distributed Processing Systems” 1978, Prentice Hall.
7. George Coulios, “Distribute System: Design and Concepts”, Pearson Education

MCA DD 803 – Network Security

UNIT-I

Classical Encryption Techniques: Symantec Cipher model, substitution Techniques, transposition techniques, rotor machines, steganography. Block Ciphers and the Data Encryption standards: Simplified DES, block cipher principles, the data encryption standard, the strength of DES, differential and linear cryptanalysis, block cipher design principles, block cipher modes of operation. Advanced Encryption Standard: Evaluation Criteria for AES, the AES cipher. Contemporary symmetric ciphers: Triple DES, blowfish Confidentiality using symmetric encryption: Placement of Encryption function, traffic confidentiality, key distribution, and random number generation.

UNIT-II

Public key Encryption and Hash functions : Prime numbers, Fermat's and Euler's Theorems, testing for primality, the chinese remainder theorem, discrete logarithms. Public key cryptography and RSA: Principles of Public key cryptosystems, the RSA algorithm. Key Management other public key cryptosystems: Key management, diffie-Hallman key exchange, elliptic curve arithmetic, and elliptic curve cryptography.

UNIT-III

Message authentication and Hash function: Authentication Requirements, Authentication functions, message authentication codes, hash functions, security of hash function and MACs. Hash Algorithms: MD5 message digest algorithm, secure Hash algorithm, ripemd-160, HMAC. Digital Signature and Authentication protocols: Digital signatures, Authentication protocols, and digital signature standard. Authentication Applications: Kerberos, X.509 Authentication service.

UNIT-IV

Electronic Mail Security: Pretty Good privacy, S/MIME.

IP Security: IP Security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management.

Web Security: Web security considerations, secure sockets layer and transport layer security, secure electronic transaction.

UNIT-V

Part four system security: Intruders, intrusion detection, and password Management. Malicious software: Viruses and related threats, virus Countermeasures. Firewalls: Firewall Design Principles, Trusted systems.

BOOKS

1. William Stallings "Cryptography and Network Security", 3 ed, Pearson Education.
2. W.Stallings " Network security Essential " Applications & Standards", Pearson ed.
3. Kanfren "Network Secirity : Private Communications in a public world 2/e
4. Eric Maiwald " Network Secirity : A Peginner's Guide, second ed.", Tata Mcgraw Hill.
5. Roberta Bragg " Mark Rhodes, Ousley & Keith Strassberg Network Secirity : The Complete Reference " Tata McGraw Hill.
6. Eric Maiwald "Fundamentals of Network Security" Wiley India.

Elective-III MCA DD 804(1) JAVA-II

UNIT I

Intorduction of Web Designing: **HTML:** HTML Basic Tags, Formating tags,Links,List,Designing Forms. Cascading Style Sheets. JavaScript in HTML, J2EE Overview, J2EE Architecture, J2EE APIs, J2EE Containers

Servlets: HTML Forms, Servlets Overview, Servlet Lifecycle: init(), service(),destroy(), Generic Servlet,Servlet Request, and Servlet Response, Http Servlet Request, Http Servlet Response and Http Servlet, Request-response, headers, GET, POST

UNIT II

JSP: JSP architecture, JSP tags and JSP expressions, Fixed Template Data ,Lifecycle of a JSP, Model View Controller (MVC), Model 1/Model 2 Architecture, Data Sharing among servlets & JSP, Request, application, session and page scope, JSP implicit objects, isElignore attribute, buffer and auto flush attributes, info attribute ,errorPage and is errorPage attributes, is Thread safe Attribute, extends attribute, language attribute, Including files and applets in jsp Pages, using java beans components in JSP documents

UNIT III

JDBC: Advanced JDBC data types, immediate solutions. **JSTL:** The role of taglibs in JSP, The genesis of the Jakarta Taglibs project, Understanding JSTL expression language (EL), Iteration actions, URL actions, Configuring settings, Formatting actions, Database actions with the DBTagslibrary

UNIT IV

Java Beans: Enterprise Bean overview, Types of enterprise beans, Advantages of enterprise beans, The Life Cycles of Enterprise Beans, Working with Session Beans, Statefull vs. Stateless Session Beans, Working with Entity Beans, Message Driven Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Java Beans API

UNIT V

Struts Framework: Struts Architecture, Struts classes ActionForward, ActionForm, ActionServlet, Action classes, Understanding struts config. xml, Understanding Action Mappings, Struts flow with an example application, Struts Tiles Framework, Struts Validation Framework, Internationalizing Struts Application, Struts with Message Resources

Books:

1. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
2. Jakarta Struts Cookbook, Bill Siggelkow, S P D O'Reilly for chap 8
3. Murach's beginning JAVA JDK 5, Murach, SPD
4. An Introduction to web Design and Programming –Wang Thomson
5. Web Applications Technologies Concepts- Knuckles,John Wiley
6. Programming world wide web-Sebesta,Pearson
7. Building Web Applications-NIIT,PHI
8. Web Warrior Guide to Web Programmimg-Bai/Ekedaw- Thomas
9. Beginning Web Programming-Jon Duckett WROX.

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Elective-III MCA DD 804 (2) MULTIMEDIA

Unit I

Introduction to Multimedia – Characteristics – Utilities – Creation -Uses – Promotion – Digital Representation – Media and Data streams – Multimedia Architecture – Multimedia Documents

Unit II

Text : types – font - Unicode standard - text compression - file formats. – Image: types - image processing – standards - specification - device independent color models - gamma correction - file formats – Video :video signal transmission -signal formats - broadcasting standards - digital video standards - PC video - video file formats – Audio : acoustics - characteristics of sound - elements of audio system – microphone – amplifier – loudspeaker - audio mixer - digital audio - MIDI – Graphics – components of graphics system, co-ordinate system – plotter - Intro to 2D & 3D Graphics -surface characteristics and texture - lights – Animation :key frames & Tweening, techniques, principles of animation, 3D animation, file formats.

Unit III

Visual Display Systems – CRT - video adapter card - video adapter cable – LCD – PDP - optical storage media - CD technology - DVD Technology - Compression Types and Techniques – CODEC - GIF coding standards – lossy and lossless – JPEG - MPEG-1 - MPEG-2 - MP3 - Fractals – MMDBS.

Unit IV

Authoring tools – features and types - card and page based tools - icon and object based tools - time based tools - cross platform authoring tools – Editing tools - text editing and word processing tools - OCR software - painting and drawing tools - 3D modeling and animation tools - image editing tools –sound editing tools - digital movie tools – plug -ins and delivery vehicles for www

Unit V

Software life cycle – ADDIE Model – conceptualization – content collection and processing – story – flowline – script - storyboard - implementation - multiplatform issues – authoring – metaphors – testing – report writing - documentation - case study: -Web Application – Console Application – Distributed Application – Mobile Application - games consoles – iTV – kiosks – Education.

TEXT BOOKS

1. Parekh R “Principles Of Multimedia” Tata McGraw-Hill, 2006.
2. Ralf Steinmetz, Klara Nahrstedt, “Multimedia: Computing, Communications and Applications” Prentice Hall, 1995.

REFERENCES

1. Tay Vaughan, “Multimedia: Making It Work” McGraw-Hill Professional, 2006
2. Deitel & Deitel “Internet & World Wide Web How to Program”, Fourth Edition – Prentice Hall, 2008.

Elective-III MCA DD 804 (3) Digital Image Processing

Unit I

Digital image fundamentals: elements of visual Perception, light and electromagnetic spectrum, image sensing and Acquisition, imaging sampling and quantization, intensity transformations and spatial filtering: basics, histogram processing, smoothing spatial filters.

Unit II

Image restoration and reconstruction: a model of image degradation/restoration process, noise models, restoration in presence of noise only-spatial filtering, estimating the degradation function, inverse filtering, Image Enhancement: Arithmetic and logical operations, pixel or point operations, size operations, Smoothing filters-Mean, Median, Mode filters – Comparative study, Edge enhancement filters – Directorial filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity & DIFF Filters, prewitt filter, Contrast Based edge enhancement techniques. – Comparative study Low Pass filters, High Pass filters, sharpening filters. – Comparative Study, Comparative study of all filters.

Unit III

Color image processing: fundamentals and models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening, image segmentation based on color.

Unit IV

Image enhancement: (By FREQUENCY Domain Methods): Design of Low pass, High pass, EDGE Enhancement, smoothening filters in Frequency Domain, Butter worth filter, Homomorphic filters in Frequency Domain Advantages of filters in frequency domain, comparative study of filters in frequency domain and spatial domain.

Unit V

Image Segmentation: fundamentals, point, line and edge detection, region based segmentation.

Morphology: Dilation, Erosion, Opening, closing, some basic morphological algorithms, gray scale.

References:-

1. R.Gonzalez and P.Wintz, "Digital Image Processing", Addison Wesley 2nd Ed, 1987.
Applicable to Students admitted from 2015 onwards.
2. Anil K.Jain, "Fundamentals of Digital Image Processing", PHI 1995.
3. William. K.Pratt, "Digital Image Processing", Wiley Interscience, 2nd Ed, 1991.
4. Milan Sonka vaclan Halavac Roger Boyle , "Image processing, Analysis, and Machine vision", Vikas Publishing House

Elective-IV MCA DD 805 (1) Mobile Computing

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS 9

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

UNIT II TELECOMMUNICATION SYSTEMS 11

GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Handover – Security - GPRS

UNIT III WIRELESS NETWORKS 9

Wireless LAN – IEEE 802.11 Standards – Architecture – services – HIPERLAN – AdHoc Network – Blue Tooth.

UNIT IV NETWORK LAYER 9

Mobile IP – Dynamic Host Configuration Protocol – Routing – DSDV – DSR – AODV –ZRP – ODMR.

UNIT V TRANSPORT AND APPLICATION LAYERS 7

TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing – Selective Retransmission – Transaction Oriented TCP – WAP – WAP Architecture – WDP – WTLS – WTP – WSP – WML – WML Script – WAE – WTA.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Prentice Hall of India / Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Second Edition, Prentice Hall of India / Pearson Education, 2004.

Elective-IV MCA DD 805 (2) Parallel Computing

UNIT I

Introduction to Parallelism and computing; Parallel machine model; Parallel Programming model; temporal parallelism, data parallelism, combined temporal and data parallelism, data parallelism with dynamic and quasi-dynamic assignment, specialist data parallelism, coarse-grained specialized temporal parallelism, agenda parallelism. Task dependencies and task graphs.

UNIT II

Structures of parallel computers: classification of parallel computers based on data / instruction flow, coupling, mode of accessing memory, grain size, vector supercomputers, systolic processors.

UNIT III

Shared memory parallel computers based on shared bus & intercommunication networks, direct and indirect networks.

UNIT IV

Message Passing Systems, MPI Programming, point-to-point communications, collective communications.

UNIT V

Methodical design; Partitioning, Communication, Agglomeration, Mapping. Design and development of parallel processing systems, Unix workstation clusters, Master slave programming, Multi-threaded programming, Scheduling Concurrency.

TEXT

1. Kai Hwang and Zhi.Wei Xu, “Scalable Parallel Computing”, Tata McGraw- Hill, New Delhi 2003.

REFERENCES

1. David E. Culler & Jaswinder Pal Singh, “Parallel Computing Architecture: A Hardware/Software Approach”, Morgan Kaufman Publishers, **1999**.
2. Michael J. Quinn, “Parallel Programming in C with MPI & OpenMP”, Tata McGraw-Hill, New Delhi, **2003**.
3. Kai Hwang, “Advanced Computer Architecture” Tata McGraw-Hill, New Delhi, **2003**.
4. Aki, Selim G.: “The Design and Analysis of Parallel Algorithms”, Prentice Hall, Englewood Cliffs, New Jersey **1989**
5. Krik, David B. and Hwu, W.W.: “Programming Massively Parallel Processors - A Hands on Approach: Applications of GPU Computing Series”, Elsevier Inc. **2010**
6. Pacheco, Peter S.: “Parallel Programming with MPI”, Morgan Kaufmann publishers, Inc., California. **1997**
7. Quinn, M. J.: “Parallel Computing: Theory and Practice”, Tata McGraw Hill. **1994**
8. Rajaraman, V and Murthy, C. Siva Ram: “Parallel Computers Architecture and Programming”, Prentice Hall of India.

Elective-IV MCA DD 805 (3) SOFTWARE ARCHITECTURE

Unit I

Overview of Software development methodology and software quality model, different models of software development and their issues. Introduction to software architecture, evolution of software architecture, software components and connectors, common software architecture frameworks, Architecture business cycle – architectural patterns – reference model.

Unit II

Software architecture models: structural models, framework models, dynamic models, process models. Architectures styles: dataflow architecture, pipes and filters architecture, call-and return architecture, data-centered architecture, layered pattern architecture, agent based architecture etc. Software quality attributes and models.

Unit III

Software architecture implementation technologies: Software Architecture Description Languages (ADLs), struts, hibernate, J2EE – JSP, Servlets, EJBs; middleware: JDBC, JNDI, JMS and CORBA. Role of UML in software architecture.

Unit IV

Software Architecture analysis and design: requirements for architecture and the lifecycle view of architecture design and analysis methods, Cost Benefit Analysis Method (CBAM), Architecture Tradeoff Analysis Method (ATAM). Active Reviews for Intermediate Design (ARID), Attribute Driven Design method (ADD), architecture reuse, Domain –specific Software architecture.

Unit V

Software Architecture documentation: principles of sound documentation, refinement, context diagrams, variability, software interfaces. Documenting the behavior of software elements and software systems, documentation package using a seven-part template.

Text Books

1. Bass, L., P. Clements, and R. Kazman, “Software Architecture in Practice”, Second Edition, Prentice-Hall 2006.
2. Dikel, David, D. Kane, and J. Wilson, “Software Architecture: Organizational Principles and Practices”, Prentice-Hall, 2001.

Reference Books

1. Bennett, Douglas, “Designing Hard Software: The Essential Tasks”, Prentice-Hall, 1997.
2. Clements, Paul, R. Kazman, M. Klein, “Evaluating Software Architectures: Methods and Case Studies”, Addison Wesley, 2001.
3. Albin, S. “The Art of Software Architecture”, Indiana: Wiley, 2003.
4. Robert Mee, and Randy Stafford, “Patterns of Enterprise Application Architecture”, Addison-Wesley, 2002.
5. Witt, B., T. Baker and E. Meritt, “Software Architecture and Design: Principles, Models and Methods”, Nostrand Reinhold, 1994.