

ADVANCED DATA STRUCTURE AND ALGORITHM – MCS-11

Theory Paper – 100 Marks

Sessional – 50 Marks

Unit I

Introduction to basic data structure , Randomized algorithm, a min-cut algorithm, Las Vegas and Monte Carlo, /Binary Planner Partition , a probabilistic recurrence , computational model & complexity classes.

Unit II

The fundamental Data-structure problem. Random treaps, Mulmuley games, analysis of treaps, skip lists.

Unit III

Analyzing random skip lists, Hash families, strongly universal hash families , Hashing with $O(1)$ search time, Nearly perfect hash families , achieving bounded query time storage management, markov chains .

Unit IV

Graph connectivity, Random walks on graph , on line paging algorithm, adversary models.

Unit V

Genetic algorithms & its application .Parallel & distributed algorithms.

BOOKS:

- 1 Data Structure & Algorithm Analysis in C by Mark Allen Weiss, Addison Wesley.

DISTRIBUTED COMPUTING – MCS-12

Theory Paper – 100 Marks
Sessional – 50 Marks

Introduction to the distributed systems, Pros and Cons of distributed Processing, distributed databases, distributed Resources, distributed Networks management. Design Considerations; Communication line loading , Partitioning and Allocation, Network Data Base design Consideration .data Communications distributed Networks-Uylessd, Black.

Fundamental of Network and distributed Operating System, Remote Service Robustness Design issues, distributed file system , Naming and Transparency, Remote file Access, File replication , Distributed coordination ; Event ordering, Mutual exclusion , Atomicity , concurrency control, Deadlock handling, various algorithms.

Distributed shared Memory ; Architecture, Design & Implementation issues, Granularity, structure, replacement strategy , Thrashing synchronization : clock synchronization, Event Ordering, Mutual Exclusion Process Management: Process Migration Threads. Case studies: Amoeba, V-System , Mach, Chorus.

BOOKS :

- 1 Computer Networks: Tanenbaum.
- 2 Data Communication and Distributed Networks : Black.
- 3 Distributed Operating System: Sinha
- 4 Internetworking with TCP/IP : Comer.
- 5 Data Communications, Computer Networks and Open Systems : Hallsall.
- 6 Data Communications : Stalling.

COMPUTATIONAL MATHEMATICS – MCS-13

Theory Paper – 100 Marks
Sessional – 50 Marks

Real Analysis : Functional of several variables, continuity; partial derivatives; Taylor's theorem, applications to stationary value problems; Language multipliers; directional derivatives, the operators div, curl, grad; Jacobians, Jacobian theorems; double, triple, line and surface integral; theorems of Gauss and Stokes: applications.

Algebra: n-Dvectors, vector spaces, linear dependence . Determinants and matrices of order n-Rank, eigen values, quadric forms, applications.

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Basic MATLAB function and applications. Fuzzy Set Theory and application to communication problems, Fuzzy MATLAB tools.
DFT,FFT and MATLAB tools for wavelet transform.

ELECTIVE – I – MCS-14

Theory Paper – 100 Marks

Sessional – 50 Marks

OBJECT ORIENTED MODELING & DESIGN

Overview of Object Oriented concepts :

Need for Object Oriented Programming, characterization of Object oriented languages

Object Oriented Design : Objects structure concepts, methodology for object oriented design(Booch,& chen & chen) ,Design modelling, system design life cycle

Object oriented programming : an overview of C++ programming ,loops and decisions, structures and functions, objects and classes , array and pointers, Inheritance , virtual functions files and stream

Object oriented data bases :relational V\s object oriented dat bases .the architecture of OO databases ,query languages for OO databases ,Gemstone\O2\orion

Distributed Object Oriented Systems : object management group, CORDA

Books ;

1. Object Oriented s\w development by Mc. Gregor and Sykes DA ,Van Nostrand Pub
2. OOP in C++ by Lafore ,Galgotia Pub
3. The C++ programming Language by Stroustrup B,Addison Wesley
4. Introduction to OOP by Witt,K.V.,galgotia Pub.
5. Object Data management by Cattel R., Addison.Wesely
6. Modern Database System by Kim W,ACM Press,Addison Wesley
7. OOP by Blschek G,Springer Verlag.

NETWORK SECURITY AND CRYPTOGRAPHY

Basic concepts: Information Systems reviewed; Batch Systems ; On-line Systems ;Wide Area Networks(WAN), Metropolitan Area Networks(MAN),Local Area Networks (LANs: applications types)
Security defined ; Roles.

Models: Characteristics of security models , Reference monitor concept, Formal Security Models – Harrison- Piazzo model, Ulman Model, Bell La-Fadila Model, Object-oriented Model, Clares Willson, Chines Wall Model,etc.

Information Flow , Role based access control. Covert channels, Security mechanisms in Operating Systems.

Policy Paradigm: Meta policies.

Implementing a security model , formal specifications and verification methodologies. Targets; Facility , Hardware , Software ,Applications, Data Communications, Procedures (Administrative), Personnel.

Threats to Security: Areas of vulnerability, Physical Security, Data Security, Systems Security, Computer System Security, Communication Security, Personnel Security
Threat Perpetration: Sources. Manmade, accidental. Threat prevention measures. Identity verification , Cryptography. Disaster recovery and Contingency Plan , Security Management , The future of Computer Security.

Books :

1. Security & Protection in Information Systems by Grissonnanche, North Holland
2. Cryptography and Data Security by Denning, Addison Wesley.
3. Computer Security Management by Frocht, Boyal & Frasev.
4. Security architecture for open Distributed systems by Muflic, JohnWiley.
5. Network Security by Kacifman & Perlman, PHI.
6. [Http//www.Theory.les.MIT.edu/Rivest](http://www.Theory.les.MIT.edu/Rivest)

ARTIFICIAL INTELLIGENCE & FUZZY LOGIC

Game Playing: Overview, Minimax search procedure, adding Alfa-Beta cutoffs, Additional Refinements ,Iterative Deepening, References on specific Games

Planning : Overview. An Example Domain components of a planning system Goal Stack planning, nonlinear planning using constraint posting hierarchical planning, reactive systems

Other Planning Techniques

Understanding: what is understanding? What makes understanding hard? Understanding as constraint satisfaction

Natural Language Processing: Introduction ,Syntactic Processing. semantic analysis, Discourse and pragmatic processing

Parallel in distributed AI: Psychological Modeling, parallelism in Reasoning Systems, distributed Reasoning systems.

Learning: rote learning, learning by taking advice ,learning in problem solving, learning from examples , explanation based, discovery, analogy, formal learning theory, neural net learning and genetic learning.

Connectionist Models :Introduction, learning in neural networks, applications of neural network, Recurrent networks, distributed Representations, Connectionist AI and symbolic AI ,case studies, of NNs in pattern recognition, Image processing, Computer vision etc.

Common Sense: Qualitative Physics, Common Sense, ontologies ,memory organization,case based reasoning.

Fuzzy Logic: Introduction, Fuzzy Set Theory, Fuzzy Set Relations, statistical decision making, Introduction to Fuzzy Logic Controllers, various Fuzzyfication and Defuzzification methods.

Some case studies of FLCs in diagnosis, control, human activities, Robots ,Image recognition, Data bases, information retrieval expert system for damage assessment. Introduction to Neuro-Fuzzy systems and its applications in real world computing.

Overview of evolutionary Algorithms and its applications in search and optimization areas.

BOOKS

- 1.Artificial Intelligence –E.Rich, K. Knight,TMH
- 2.Fuzzy Systems Theory and its Application– Terano,K.Asai,M.Sugeno,
- 3.Introduction to Nerual Networks-Wassermann,van Nostrand,Reinhold.
4. Fuzzy Sets and Fuzzy Logic-G.Klir and B Yuan ,PHI
- 5.Artificial Inteligence,an Engineering approach –R.I Sehal ,Koli,Me Graw hill
- 6.Hand Book of evolutionary Algorithms-Oxford University press.

COMPUTER AIDED DESIGN

Introduction:

The nature and role of design, the nature of CAD, type of CAD system, concept of integrated CAD benefits of CAD, the price of CAD, system, origin of CAD, applications of CAD.

Computer aided design system hardware:

Introduction graphics input devices as light pens, analog devices, keyboard devices etc. graphics display devices as CRT displays, plasma panel display etc. graphics output devices as pen plotters, electrostatic plotters other, graphics output devices and modes of their operation , CAD system configuration .

Computer aided design system software:

Introduction operating system, the overlay graphics systems, graphics database handling and structure, operating features, symbols, macros, editing facility, data selection , graphics transformation plotting, graphics standards as GKS and CORE, GKS 3-D and PHIGS, IGIS others graphics standards.

Transformation systems:

Display, windowing and clipping, two dimensional transformation, three dimensional transformation, linear transformation, display files of three dimensional data, visualization of three dimensional data, eye co-ordinator system, joystick function, distortion.

Use of micro computers in CAD system:

Microcomputer systems, CAD system based on microcomputers, choice of microcomputer system by considering microprocessor, primary memory, backup storage, communication system, software for CAD system.

Computer aided design of filters, printed & integrated circuits.

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ELECTIVE - II

Theory Paper – 100 Marks
Sessional – 50 Marks

ADVANCED COMPUTER ARCHITECTURE

Flynn's & Handler's Classification of parallel computing structures. Pipelined & Vector Processors. Data & control hazards and method to resolve them. SIMD multiprocessor structures. Interconnection networks. Parallel algorithms for array processors. Search algorithms, MIMD multiprocessor Systems, Scheduling and load balancing in multiprocessor systems, Multiprocessing control and algorithms.

Books Recommended:

1. "Computer Architecture and Organisation"- John Hays, Mc. Graw-Hill.
2. "Computer Architecture and Parallel Processing"-Hwang and Briggs, Mc. Graw-Hill book company.

ARTIFICIAL NEURAL NETWORK

Unit 1

Ann Definition, Taxonomy of neural net classifiers for fixed patterns, Mc-Culloch & Pitts Model, structure and working of human brain & comparison with basic ANN model, single layer network. Perceptron training algorithm, linear separability, Hebb's learning rule, Widrow & Holf's learning rule / Delta rule, ADALINE, MADALINE, Comparison of ANN with human brain and AI characteristics and application of ANN.

Unit II

Multilayer perception, problem with linear activation function, different activation functions like sigmoidal/squashing function, linear threshold function, hyperbolic tangent and Gaussian function. Rumelhart's error back propagation algorithm (EBPA) with proof, momentum, limitations, characteristics and Application of EBPA, case study : NETTALK, two dimensional pattern recognition etc.

Unit III

Fast training of MLP : EBP using direct solution methods (EBPVDS) , DR symmetric Gaussian Elimination Method (DRSGE) , Random MBD (Minimum Bit distance) Gram-Schmidt methods (RMGS), case study: Function approximations, Pattern recognition and vowel recognition. Counter Propagation Network: Network Structure, functioning in Normal & Training mode, characteristics of CPN.

Unit IV

Deterministic v/s statistical training, Boltzman training, Cauchy training, Artificial specification methods. Hopfield /recurrent network, configuration, stability constraints, Associative memory characteristics, limitations and applications Hopfield v/s boltzman machine. Competitive learning : concepts, weight change, example 7 characteristics, lateral inhibition : concepts & examples.

Unit V

Kohonen self-organizing feature map resemblance with human brain, feature map algorithm- how α and d changes with time, examples and properties. Adaptive Resonance Theory(ART): Architecture, classification, implementation & training. Optical neural network, Cognitron and Neocognitron.

DIGITAL SIGNAL PROCESSING

1. Representation and analysis of discrete signal and system.
2. Z -transforms and inverse Z-transforms.
3. difference equation and representation of recursive and non recursive systems.
4. Realization of digital filters, FIR and IIR digital filters, frequency domain design of digital filters, impulsive invariance and square magnitude function techniques.
5. DFT and FET

SENSOR NETWORK

1. Monitoring Sensor network –RFIR Technology.
2. Sensor network application – Motion monitoring, Environmental monitoring, Generic Architecture, Sensor network evolution .
3. Wireless Sensor Network – Architecture.
4. Embedded Network Technology – Micro sensors , microprocessoer power and stage , microradios.;
5. Sensor Network Challenges – Miniaturization, power management, scalability, remote management, usability, standardization,security. System Challenges- Tiny OS, Network sensor platforms

DATA CENTRE MANAGEMENT

Introduction to data centre management , Pros & Cons of data centre management, Internet data centre, Data centre fabric, Scale up Versus scale out, Resource consideration for data centre, Virtual data centre and its securities.

Infrastructure management, Load Balancing and Distribution, Dynamic Power variation in data centre, Strategies for deploying Blade Server in existing data centre, Web Servers for Data centre, Application server, Power and Energy management for server systems.

On loading for Data centre servers.

Performance consideration for data centre. Security and Control issues of Data centre, Best practices for security and performance.

Study of various data centre softwares.

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FAULT TOLERANT & REAL TIME SYSTEM

Fault detection and diagnosis, System Reliability and methods of improving it. Theory of Redundant System design. Fault tolerant circuit design. Fault tolerant architectures.

Components of a real time system. Real time operating system, tasks and task scheduling, task synchronization and data transfer factors in selecting a real time operating system. The design specifications, the development environment, ASM Diagram and Data flow analysis. Response time specification.

BOOKS:

1. "Real Time System"-C.M. Krishna and Kang G.Shin, Mc Graw Hill International Edition.
2. "Software Design for Real Time Systems"-J.E.Cooling, Chapman & Hall Publication.

ADVANCED SOFTWARE ENGINEERING- MCS-21

Theory Paper – 100 Marks

Sessional – 50 Marks

Introduction, Software life –cycle models, software requirements specification, formal requirement, specification-axiomatic and algebraic specification, Function –oriented software design ,object oriented design, UML, coding and unit testing, data design architectural styles & pattern architectural design ,assessment of alternate ,architectural design ,mapping data flow into software architecture Modeling component level design, S\W reuse, Software quality & testing—SEI CMM and ISO-9001,software reliability and fault –tolerance, computer aided software engg.(CASE), Web Engg.. Formal Methods ,clean room software Engg, component based development ,software reengg,.

Laboratory :Development of requirements specification ,Function oriented design using SA\SD, Object Oriented design using UML test case design implementation using JAVA and TESTING

Text/ References

Presman R.S.,3rd Edition,Software engg.-A practitioners Approach ,Mc Graw,Hill,International,Eddition 1992

Jalote,P.1st Eddition ,2nd Eddition is Shortly due from Springer verlag.AN Integrated Approach to software engg,Narossa,1991

S/W Testing techniques ,boris,beizer,2ndEddition,Van Nostrand reinhold

Measuring S\w reuse –principles practices and economid models ,J.S.Poutin Ediition Wesley

ADVANCED DBMS – MCS-22

Theory Paper – 100 Marks

Sessional – 50 Marks

Overview of Database Management, Conceptual Database Design, Logical Database Design, Physical Database Design, Query Processing, Transaction processing, Crash recovery, Concurrency control, , Distributed Database, client/server database. Integrity security and repositories. Emerging Database trends, Design and database administration skills based on near-real life applications.

BOOKS:

1. Fundamentals of Database Systems(IIInd ed.) R.Elmasri, S. Navathe, Benjamin Cummings, 1994.
2. An introduction to Data Base systems, Volume I (V th Ed.) , C.J.Date, Addison Wesley 1994.
3. Principles of Database Systems (IIInd ed.) J.D.Ullman, Galotia Pub. 1994.
4. Client/server Strategies, Vaakevitch David, Galotia Pub. 1990.

COMPUTER GRAPHICS AND ANIMATION – MCS -23

Theory Paper – 100 Marks

Sessional – 50 Marks

Transformation and Projections. Bresenham's line drawing algorithm, Homogenous coordinate system(2D & 3D), transformation matrices for translation, scaling, rotation,, shear rotation about an arbitrary axis(3D), parallel projection, perspective projection, clipping, Sutherland cohen algorithm, cyrusbeck algorithm curves & surfaces, Development of Bresenham's algorithm to draw octant of a circle, Bezier curves, B-spline curves, solid modeling, Hidden surface removal, shading, introduction to multimedia, Non Temporal media, Audio, Video, Graphics animation..

Books recommended

1. Multimedia Systems Design, P.K.Andleigh & K.Thakrar, Prentice Hall PTR,1996(TB1)
2. Multimedia Computing, Communication & Applications, Ralf Steinmetz and Klara Nashtedt. Prentice Hall.1995(TB2)
3. Multimedia Systems, Ed. By John F.K Buford, Addison-Wesley Pub.Co.1994.

ELECTIVE – III – MCS-24

Theory Paper – 100 Marks
Sessional – 50 Marks

PARALLEL COMPUTING

Parallel processing, Parallel computer structure, designing of parallel algorithms, analyzing algorithms, general principles of parallel computing, Parallel sorting algorithms, Batcher's bitonic sort. Bitonic sort using the perfect shuffle, parallel bubble sort, add-even transport sort, Tree sort, quick sort, sorting on the CRCW, CRFW, EREW models, searching a sorted sequence, CREW, CRCW, & EREW searching, searching on a random sequence EREW, ERCW, CREW & CRCW searching on the tree, mesh .a network for merging ,merging on the CRFW, ERFW models, computing Fourier Transforms, Computing the DFT in parallel, a parallel FFT algorithm .

BOOKS:

1. " Design and Analysis of Prallel Algorithm by Salim & Akl, PIII(International Editions)
2. "Design Efficient Algorithm for Parallel Computers by Michel J.Quinn. Mc Graw Hill, I nternational Editions.

COMPUTER AIDED SIMULATION & MODELING

System & models:

The concept of a system, system environment, stochastic activities, continuous and discreet system, system modeling, type of models, stastic physical models, dynamic physical models, stastic mathematical models, dynamic, mathematical models, principals used in muddling, simulation of a pare pursuit problem simulation of an inventory problem.

Simulation of continuous system:-

Continuous system models, differential equations, analog computers, analog methods, hybrid computers, digital analog simulations continuous system simulation languages, CSMP III hybrid simulation, feedback system, simulation of an interactive system, real time simulation.

Discrete system simulation:-

Probability concepts in simulation, random number generations and their testing stochastic variable generation, fixed time - step vs. event-to event model.

Simulation of queuing systems :

Arrival pattern, poisson arrival pattern, the exponential distribution, the hyper-exponential distribution, service times, simulation of a single-server queue, the normal distribution, measures of queues.

Simulation languages

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Continuous and discrete simulation languages, block structured continuous simulation languages, GPSS, SIMSCRIPT, SIMULA, factor in selection of a discrete simulation language.

VLSI DESIGN

Unit I:-

Review of Logic Design fundamentals:- Combinational Logic, k-maps, designing with NOR and NAND gates. Hazards in combinational Networks. Mealy sequential network design. Moore sequential network design, synchronous design, machine design.

Introduction to VHDL:- VHDL description and combinational network. Modeling flip flops multiplexes using VHDL processes. Compilation and simulation VHDL code . Modeling sequential machines , variables, signals and constants , arrays, VHDL operator functions and procedures, packages and libraries .

Unit II :-

Attributes, multivolume logic and signal resolutions, IEEE 1164 standard logic , generics , generate statements, synthesis of VHDL codes, synthesis examples, files and TEXTIO.

Unit III:-

Designing with programmable logic devices ROM, PLA's, PAL's , PLD's, designing with programmable gate arrays . FPGA's , CPLD's,(Complex programmable logic devices) Floating point arithmetic multiplication and other operations.

Unit IV:-

Hardware testing and design:- Combinational logic testing , sequential logic testing , scan testing , boundary scan, built-in self test.

Unit V:-

Design examples and case studies :- USART design, micro- controller design, design of microcontroller CPU, Filter design etc.

BOOKS:-

1. VHDL Primer by Bhaskar
2. Digital System design using VHDL by Charles Roth
3. Modern VLSI Design system on silicon by Wayne Walf.

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DIGITAL IMAGE PROCESSING

Unit 1

Introduction, Image processing system: Image process , digitizer, display & recording devices

Digital image Fundamentals: Image model, relationship between pixels imaging geometry.

Unit 2

Manipulation on images, image transformation: Introduction to fast fourier transformation, walsh transformation, hadmard transformation, hotelling transformation, hough transformation

Image Enhancement: Spatial domain method, frequency domain method, histogram, modification.

Image smoothing : Neighbourhood averaging, median filtering, low pass filters average of multiple images.

Image sharpening by differentiation technique high pass filtering.

Unit 3

Image Restoration:

Degradation model for continuous function, effect of diagnalization on the degradation models, algebraic approach to restoration. East mean square filter, interactive restoration, gray level interpolation.

Unit 4

Image Encoding & segmentation:

Encoding: Mapping, quantize, coder.

Segmentation: Detection of discontinuation by point detection, line detection edge detection.

Edge linking & boundary detection: Local analysis , global by Hough transform & global by graph theoretic techniques.

Thresholding: Definitation, global thresholding

Filtering : Median, gradient.

Unit 5

Simple method of representation

Signatures, boundary segments, skeleton of a region.

Polynomial approximation.

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GEOGRAPHICAL INFORMATION SYSTEMS

Principle of GIS, Data Acquisition, Spatial Data Bases, data structures and algorithms for GIS, spatial data, manipulation and analysis, query processor, visualization ,spatial decision support system, use of a typical GIS package. GIS system architecture, GIS design and implementation, application

Text/References

Star,J.and ESTES,J., Gegographic information system-an introduction, prentice hall,NJ.,1990

De Meres, m.n., fundamentals of geographics information systems, John wiley& sons,INC.,ny,1997

Laurini, r.,Thompson,d.,fundamentals of spatial information systems, academic press London,1994

Magwire,D.J.,Goodchild,m.f. and rhind,d.m.Ed.,Geographical information systems principle and application,Longman group,U.K.,1991.

ELECTIVE – IV – MCS – 25

Theory Paper – 100 Marks

Sessional – 50 Marks

EMBEDDED SYSTEM

Unit1:-

Hardware fundamentals:-Gates, timing diagram, memory, microprocessor, buses, DMA.

Interrupts:-

Microprocessor architecture, interrupts basics, Interrupt latency, shared data problem. System partitioning, building the architectural model, Input and output processing, Hardware and software portioning, timing requirement.

Unit 2:-

Microprocessor selection, Microprocessor versus micro-control analysis CISC versus RISC study of major embedded Microprocessor architecture memory system design . system optimization architecture for embedded software:- round robin, found robin with interrupts. Function-queuescheduling and real time operating system.

Unit 3:-

Real time operating system:- tasks and task states. Task and data. Semaphores and shared data operating system service:- inter task communication . timer service. Memory management . events and interaction between interrupt routines and real time operating system . software selection issues. Selection an RTOS. RTOS performance metrics . RTOS scalability and tool support compiler selection

Unit 4:-

Embedded system design using real time operating system : encapsulating semaphores and queues.hard real time scheduling consideration saving memory space.

Unit 5:-

Development tools and debugging :-host and target machines. Linker/location. Target system testing. Instruction set. Asset macro. Establishing a software development environment C runtime environment embedded debuggers Cross- development methods embedded file formats . readers creating object files- the build process loading software on to remote targets.

1. an embedded software primer by david E.simon ISBN
2. embedded system design by Arnold S.berger

WEB TECHNOLOGY & E-BUSINESS

Basics of Electronics commerce, Characteristics of Electronics products, Digital cash and payment systems, Financial Services, Information Markets, Product choices, Internet, Infrastructure and pricing, Intranets, Firewalls Security Issues, Authentication and non repudiation of transactions, Distributed Application Architecture for Electronics commerce. Customer front end design production and supply- chain work flow in e-commerce.

Concepts & Principles of e-governance issues, features and security in e-governance.

Books

1. Koissur David: Electronic Commerce, Microsoft
2. Bajaj & Nag: Electronic Commerce, TIIM.
3. Ravi Kalakota: Frontiers of Electronic Commerce, AW.
4. <http://www.egov.doe.gov.in>
5. Web Commerce Technology By Addison Wesley
6. Designing Systems for Internet Commerce by Treese & Stilwart.
7. Applied Cryptography By Sedu & Schneir
8. Network Security by Koffman & Pearman

NATURAL LANGUAGE PROCESSING

Introduction; Goals of natural language processing and computational Linguistics. Finite state automata and transducers, Morphology.

Parsing: Context free Grammers, Generalized phrase structure Grammer, Earley Parsing Algorithm. Transformational grammer, computational models and knowledge representations, semantics; Interpretation, time, tense, lexical semantics , machine translations, Natural Language Interfaces, Natural Language Generators..

BOOKS:

1. Allen James , Natural Language Understanding, 2nd ed. Benjamin/ Cumming, 1995.
2. Grosz, Sparck-Jones Webber readings in Natural language Processing, Morgan Kufmann, 1986.
- 3 . Winograd T., Language as a Cognitive, process, Addison Wesley, 1972.
4. Marcus M., a Theory of Syntactic Recognition for natural language, MIT press, 1980.

ROBOTICS AND COMPUTER VISION

Basic components of robotics system, Kinematics and manipulators, selection of Coordinate frames, Homogeneous transformation, solution of kinematics equations, Lagrangian equations and manipulator dynamics, Control design, Languages for Robots and Applications.

3D-vision, Perspective vision, CCD camera study, real time processing, Segmentation using Genetic Algorithm: Adaptive algorithm for indoor scene, and outdoor scene. Interpretation of pictures, shape recognition, dynamics scene analysis. Introduction to AGV, clustering and non supervised learning method.

BOOKS:

1. "Digital Image Processing And Computer Vision"-R.Schalkoff, Wiley.
2. "Computer Vision"-D.H.Ballard and C.M.Brown, Prentice Hall.
3. "Introduction to Robotics"-Craig, J.J., Addison Wesley.
4. "Robot Vision"-Horn B., MIT Press.
5. "Robotics"-Lee, McGraw Hill.

ADVANCED COMMUNICATION

Digital PAM. binary PAM formats, line coding. band limited digital PAM systems. Nyquist pulse shaping, equalization, synchronization techniques. bit and frame synchronization. Coded pulse modulation. voice digitization rate (VDR) of PCM, DPCM. DM. ADM. CVSD. log PCM, their performance: comparison, VDR reduction by speech coding. VOCODERS. noise performance of PCM and DM, Digital multiplexes. AT & T and CCITT hierarchies. quasi-synchronous multiplexes.

Digital CW modulation, BPSK, DPSK, DEPSK, QPSK, M-ary PSK, QASK, BFSK. M-ary DSB-SSB. QPR coherent and non-coherent systems. error probabilities in M-ary PSK, DPSK, FSK, QPSK, 16 QAM, MSK, QPR and bit. Matched correlation and optimum filters and symbol error rate. Spread Spectrum techniques: DS-SS, CDMA, FH. PN sequence, Power requirement. PN-C sequence code. and Walsh's code.

ISDN & Value added communication system simulation & Analysis using MATLAB & Simulink Application using communication toolboxes.

Suggested Text Books and References:

1. Digital Communication By Haykins McGraw Hill 2nd Edition.
2. Modern Digital & Analog Communication. By B P Lathi. Wiley Eastern Ltd. 2000.
3. Communication Systems by A B Carlson. Tata McGraw Hill. 2000.

SOFTWARE PROJECT MANAGEMENT – MCS-31

Theory Paper – 100 Marks

Sessional – 50 Marks

UNIT - 1

Managing software projects Software product, process and project management CMM, KPAs .For project management, software process Improvement, resources management, team work and structure, training, project metric, documentation, project management. For conventional and object oriented software projects, software project, knowledge based management

UNIT 2

Project planning

Project planning infrastructure, process planning feasibility analysis cost and efforts estimation, models and technique, risk analysis and RAMM plan, project scheduling and tracking plan .SQA and quality planning ,SCM activities and plan , project management plan.

UNIT 3

PROJECT EXECUTION AND CLOSURE

Data collection, measurement , reviews, monitoring and control , status reporting , process input and output synchronization, deliverables , milestone recording and their analysis , defect analysis and prevention , audits

Project closure analysis and reporting.

UNIT 4

Project management for special classes of software project - Using CASE tools, CASE, re-engineering ,reverse ,forward engineering Client/server software engineering , web engineering , outsourcing , software project management standards

References:

1. Hughes and cotterell, software project management, 3e ,tata mcGRaw-hill pub. Cob. Ltd
2. Stephen r. schach ,”object –oriented and classical software engineering”5th edition, tata Mc graw-hill pub. Co.Ltd.
3. Dr panmkaj jalote , “software project management “” pearson publication
4. Dr. pankaj jalhote ,CMMin practice ,prearson publication
5. R. pressmen , software engineering 5th edition Mcgraw Hill publication
6. lan Somerville , software engineering , 5th edition ,AWL publication

ELECTIVE – V - MCS-32

Theory Paper – 100 Marks
Sessional – 50 Marks

BIOINFORMATICS

Bioinformatics – an overview

Introduction, objectives of bioinformatics, kind of data used, information molecules, basic structures of nucleic acids, DNA ,RNA, DNA sequencing and polymerise chain reaction(PCR), proteins structure, functions, protein folding and characterization.

Biological Databases

Introduction, types of databases, nucleotide and protein sequence database, major bioinformatics databases, Introduction to biostatics, data integration, data analysis. Operating systems (LINUX, UNIX), HTML, XML, CML, BSML, etc.,.

Sequence analysis

Models for sequence analysis, methods for alignment (Dot matrices), methods for optimal alignment (gap penalties and storing matrices), tools for sequence alignment – Fasts, BLAST, PSI –blast, Multiple Sequence Alignment(MSA) – tool and applications.

Phylogenetic analysis

Phylogenetic trees, distance matrix (MD) and character based methods, gene prediction tools , gene mapping, DNA sequencing, algorithms for alignment of sequencing fragments , DNA micro arrays.

Proteomics

Proteomics analysis, tools for proteome analysis, different structural proteins, protein classification, methods of structure prediction (known folds and unknown folds), protein function prediction, metabolic pathways , gene networks their properties and analysis.

BOOKS RECOMMENDED

1. Introduction to bioinformatics : Attwood.
2. Bioinformatics sequence and genome analysis – David W. Mount
3. Bioinformatics- concept, skills and applications – S.C.Rastogi

4. Recent advances in Bioinformatics- Irfan K. Khan.

DATA MINING AND ITS APPLICATIONS

1. 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.

2. Association Rules & Clustering Techniques:

Introduction, Various association algorithms like Apriori, Partition, Pineer 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.

3. Other DM techniques and Web Mining:

Application of Neural Network, AI, Fuzzy Logic and Generic algorithm. Decision tree in DM. Web Mining. Web content mining , Web structure Mining. Web usage Mining.

4. 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.

5. 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.

Books suggested:

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.

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WIRELESS & MOBILE COMPUTING

Unit 1:

Introduction to wireless, cellular, Digital , PCs mobile radio, speech coding for wireless system and application PCM, DPCM, DM, Vocoder & linear Predictive coding. Performance comparison.

Unit II:-

Media access control, Telecom system satellite system, broadcast system.

Unit III:-

Wireless LAN: IEEE802-11 Hiper LAN, Bluetooth, Adhoc Network: Characteristics , performance issue , routing in mobile host.

Unit IV:-

Network Issues: Mobile IP, DHCP< mobile transport layer, Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, selective transmission, transaction oriented TCP.

Unit V:-

Application Issue: Wireless Application control Dynamic DNS , File system synchronization protocol, context aware application security, analysis of existing wireless network.

References:

- 1.J. Schiller Mobile commm., Addison Wiley;
2. William C.Y. Lee, Mobile comm., design Fundamentals. John Wiley.
3. Dr. Kamilo Feher , wireless digital comm.. , PHI
4. Mark Caempa, Design & Implementation Of wireless LAN's , Thomson Learning.

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PATTERN RECOGNITION

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.

Combine detection method, edge detection, edge linking, gradient, laplacian, line detection, motion based , point detection snake method.

Boundary description, detection, matching, merging, segmentation, smoothing, splitting of boundaries syntactic, analysis of region boundaries, study of shape by region analysis. Explanation of how fuzzy approach can be applied to pattern recognition, classscificatory analysis preprocessing, feature detection and primitive extraction, adaptive classification of fuzzy grammar.

Algorithms of pattern recognition, neural network fundamentals, approach for pattern recognition.

HUMAN COMPUTER INTERACTION

Interaction between computation and the physical world. Input and output devices in their various forms – devices susch as keyboards and printer, robotic sensors and effectors.

Interaction between computation and biological world – Sensor for biological substances and process and effectors that can intervene in them.

Interaction between computation and people – traditional discipline of human computer interaction, authorization process that entitle people to access computational resources.

Computer to Computer Interaction – Networking, Parallel / Distributed Computing/ Grid Computing / Utility Computing.

INFORMATION ARCHITECTURE & SECURITY

1. Principles of Information Security, Security Threats, risks, physical security of computer, hardware security.
2. Data preservation : Information Systems analysis for security of database system and techniques of access control.
3. Software security: encryption, decryption, basic cryptography, firewalls, digital certificates, digital signatures, security algorithms like RSA,DSA,DES etc.
4. Security in in E-Commerce application: Web server security, security in computer networks and distributed systems, security protocols, virtual private networks, security in mailing systems. Shareware.

Books recommended:

Jae K Shin , Anique A Qureshi, J G Siegel,"computer Security", HPD
D Gollman "Computer Security" John Wiley and Sons

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ADAPTIVE COMPUTING

Introduction to adaptive computing & adaptive Software like ubiquitous computing, autonomic computing.

Different approaches to implementing software adaptation, parameter adaptation, composition adaptation.

Middleware & Adaptation, Layer decomposing for middleware.

Computational reflection, component based designing. Meta object protocol. Middleware & other factors.

Composing : types, Static & Dynamic.

Key challenges : Assurance Security, Interpretability, Decision Making.