

**PONDICHERRY UNIVERSITY
RAMANUJAN SCHOOL OF MATHEMATICS AND COMPUTER SCIENCE
DEPARTMENT OF COMPUTER SCIENCE**

MASTER OF SCIENCE

(Computer Science)

(For CBCS system in Pondicherry University)

(Effective from the academic year 2009-2010)

Eligibility for Admission

Candidates who have secured 55% of marks or above in any one of the following or equivalent, are eligible to apply:

Bachelor's Degree in Computer Science/ Technology/ Applications

Duration of the Course

The course duration shall normally be of two years duration spread over four semesters. The maximum duration to complete the course shall be 4 years

Medium

The medium of instruction shall be English.

Passing Minimum

Passing Eligibility & Classification for the award of the Degree are as per the Choice Based Credit System norms

PONDICHERRY UNIVERSITY
RAMANUJAN SCHOOL OF MATHEMATICS AND COMPUTER SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
MASTER OF SCIENCE
CURRICULUM

(Effective from the academic year 2009-2010)

Note: All Course Codes are to be preceded with 'COMS'

FIRST SEMESTER

S.No.	Code	Course Title	H/S	Credits
1	411	Design of Algorithms	H	3
2	413	Computer Architecture and Organization	H	3
3	414	Visual Programming	H	3
4	415	Database Systems	H	3
5		Elective - I	S	3
6	418	Practical I - Visual Programming Lab	H	2
7	419	Practical II - Algorithms Lab	H	2

SECOND SEMESTER

Sl.No.	Code	Course Title	H/S	Credits
1	412	Automata Theory & Formal Languages	H	3
2	462	Data Communication Networks	H	3
3	463	Software Engineering Concepts	H	3
4	464	Object Oriented System Design	H	3
5	465	Web Technology	H	3
6		Elective II	S	3
7	467	Practical III –Networks Lab	H	2
8	469	Practical IV – Case Tools Lab (OOAD)	H	2

THIRD SEMESTER

Sl.No.	Code	Course Title	H/S	Credits
1	511	Principles of Compiler Design	H	3
2	512	Computer Graphics	H	3
3	513	Cryptography and Network Security	H	3
4		Elective III	S	3
5		Elective IV	S	3
6	518	Practical V- Compiler Design Lab	H	2
7	519	Practical VI - Client/Server Lab	H	2

FOURTH SEMESTER

Sl.No.	Code	Course Title	H/S	Credits
1	561	Project Seminar	H	4
2	562	Project Work	H	4
3	563	Project Report& Viva-voce	H	4

LIST OF ELECTIVES

Code	Course Title	H/S	Credits
461	Unix & Shell Programming	S	3
527	Principles of Programming Languages	S	3
528	Middleware Technologies	S	3
530	Multimedia Systems & Applications	S	3
531	E-Commerce	S	3
532	Neural Networks	S	3
533	.NET Framework and C#	S	3
538	Distributed database systems	S	3
540	Artificial Intelligence	S	3
541	Fundamentals of Agent technology	S	3
544	Software Testing and Quality Assurance	S	3
546	Data Mining and Warehousing	S	3
550	Natural Language Processing	S	3
551	Microprocessor Architecture	S	3
552	Decision Support System	S	3
553	Soft Computing	S	3
554	Principles of Distributed Systems	S	3

COMS 411:DESIGN AND ANALYSIS OF ALGORITHMS

UNIT I

Introduction: Data structure concepts - List, Stacks, Queues, Trees, Heaps, Sets, Graphs, Design of Efficient Algorithms and their Computational Complexities. **Divide and Conquer Method:** Binary search, finding maximum and minimum, merge sort, quick sort.

UNIT II

Greedy Method: Knapsack problem, Minimum spanning trees, Single source shortest path problem. **Dynamic Programming:** Multi stage graphs, All pairs shortest path problem, 0/1 Knapsack problem, Travelling sales man problem.

UNIT III

Search and Traversal Techniques for Graphs: Tree traversal techniques (inorder, preorder, postorder, levelorder), Graph traversals (BFS, DFS). **Hashing Techniques:** Internal and External hashing methods.

UNIT IV

Backtracking: Knight's tour, Eight Queen Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.

UNIT V

Branch and Bound Techniques: The method, 0/1 Knapsack problem, Travelling Salesman Problem.

TEXT BOOKS

1. Ellis Horowitz and Sartaj Sahani, "Fundamentals of computer Algorithms", (Unit I to Unit IV).
2. Robert Sedgewick, "Algorithms in C", (Unit IV - Searching & Sorting Algorithms)

REFERENCES

1. Gilles Brassard and Paul Bratley, "Fundamentals of Algorithms", Prentice Hall of India Pvt.Ltd., 1997.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Addition-Wesley , Third Indian Reprint, 2000.

COMS 413:COMPUTER ARCHITECTURE AND ORGANIZATION

UNIT I

BOOLEAN ALGEBRA AND COMBINATIONAL LOGIC

Review of binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation methods – Logic gates.

Combinational circuits – Analysis and design procedures - Circuits for arithmetic operations - Code conversion – Introduction to Hardware Description Language (HDL)

UNIT II

DESIGN WITH MSI DEVICES

Decoders and encoders - Multiplexers and demultiplexers - Memory and programmable logic - HDL for combinational circuits.

Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment - Shift registers – Counters.

UNIT III

Introduction to Organization - Address Modes - Instruction set - Opcode format.

Processor Design: Processor Organization, Arithmetic Logic Unit, Design of Arithmetic Circuit, Design of Logic Circuit, Design of ALU, Status Register, Design of Shifter, Processor Unit, Design of Accumulator, Design of Floating point Arithmetic Unit.

Unit IV

Hardwired Control Logic Design: Control organization, Hardwired control for binary adder/subtractor, Design of Multiplier Control Unit, PLA Control. Micro programmed Control: Microinstructions, Grouping of control signal, Microprocessor sequencing - Microinstructions with next address fields, prefetching of Microinstructions and evaluations, bit slices.

Unit V

Memory System Design: Memory hierarchy, Associative memory, and Virtual memory, Cache memory, Memory management hardware.

I/O ORGANIZATION

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).

Text Books

1. M. Morris Mano, “Computer Systems Architecture”, Pearson Education, 3rd Edition, 2003.
2. Morris Mano, “Digital Logic and Computer Design”, Pearson Education, 3rd Edition, 2003.
3. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 6th Edition, Pearson Education, 2003.

COMS 414 :VISUAL PROGRAMMING

UNIT I

Introduction to Windows Programming: Different paradigms of programming – Comparison – Event driven programming – Windows programming fundamentals –Windows messages – Device contexts – Dynamic linking libraries.

UNIT II

Visual Basic Programming: Creating and using Controls – IDE: Menus and Dialogs — Programming fundamentals – Programming user events – Using custom controls and grid control – inbuilt and user defined functions - Debugging - Creating graphics for application – File system controls - Accessing databases with the data controls – VB and the Internet.

UNIT III

Visual C++ Programming: Visual C++ components – Developing simple applications – Microsoft Foundation classes – Controls – Message handling - Document-view architecture – Dialog based applications – Mouse and keyboard events – Reading and writing documents – SDI and MDI environments.

UNIT IV

Advanced Features in VB and VC++: Creating user defined DLL's – Dynamic data transfer functions – User interface classes – Database management with ODBC – Object Linking and Embedding – Communicating with other applications.

UNIT V

Introduction to .NET: Common Language Runtime - Overview of .NET languages - Simple windows applications using VB .NET.

TEXT BOOKS

- 1.Charles Petzold, “*Windows Programming*”, Microsoft Press, 1995.
- 2.David Kruglirski. J, “*Inside Visual C++*”, Microsoft press, 1993.
- 4.Garry Cornell, “*Visual Basic 6 Ground Up*”, Tata McGraw Hill,1998.Gray J.
- 5.Teach yourself Visual Basic .NET 2003 by Steven Holzner, Second reprint 2004 , Pearson Education

COMS 415:DATABASE SYSTEMS

UNIT- I

Introduction - DBMS Basic Concepts - Purpose of Database Systems – Database System / File System - Overall System architecture – Database Languages – Classifications – Data Models.

UNIT – II

Entity relationship model: Mapping constraints – Primary Keys – Foreign Keys –Structural Constraints. – ER notations - ER model examples – Enhanced Entity Relationship Model: EER Concepts like Generalization, Specialization, Union, Category, Disjoint, Overlapping etc. EER model examples

UNIT- III

Relational DataBase Design – ER/EER to Relational Mapping algorithm - Relational Model: Structure – Formal Query Languages – Relational Algebra – Informal Design Guidelines – Functional Dependencies – Normalization upto Third Normal Form

UNIT- IV

SQL – Basics of SQL –DDL – DML – DCL – TCL Commands in detail with examples - PL/SQL: Stored Procedure Concepts – Procedure – Functions – Cursors - Triggers.

UNIT- V

Storage and File Structure- - File Organization - Overview of Physical Storage - Organization of Records in Files - Media - Data-Dictionary Storage - Magnetic Disks – RAID - Indexing and Hashing -- Comparison of Ordered Indexing - Basic Concepts - Hashing - Ordered Indices - Bitmap Indices - Static Hashing - Dynamic Hashing.

Text Books:

1. Database system concepts – H.F. Korth and A.Silberschatz – McGraw Hill Publication (2005)

Reference Books:

1. Fundamentals of Database Systems (Chapters 1, 2, 3, 4.1, 7, 8, 9, 14) – Ramez Elmasri and B. Navathe – Addison Wesley, III Edition

COMS 418:VISUAL PROGRAMMING LAB

1. Design and develop an analog clock
2. Design and Develop an File Explorer
3. Design and Develop an intranet Chatting tool
4. Developing any system utility using win32 API.

COMS 412:AUTOMATA THEORY AND FORMAL LANGUAGES

(Only statements and applications of Theorems)

UNIT I

Automata Theory: Need for formal models - Finite State Systems – Definition of an Automaton - Non- Deterministic Finite Automaton - Equivalence of DFA and NFA - Finite automata with output (Mealy and Moore Models) - Minimization of Finite Automata – Regular Expressions.

UNIT II

Push Down Automata Theory: Context-Free Languages and Derivation Trees – Ambiguity in Context-Free Grammars – Chomsky Normal Form – Greibach Normal Form. Push Down Automata – Definition, Acceptance by Push down Automata – Push down Automata and Context Free Languages- Deterministic push down automata – Non-equivalence of PDA and DPDA.

UNIT III

Turing Theory: Turing Machines – Computable Language and Functions – Techniques for TM Construction – Modification of TM. Non regular languages and Pumping Lemma

UNIT IV

Chomsky Hierarchy: Regular Grammars – Unrestricted Grammars – Context Sensitive Languages. Linear Bounded Automata – Definition – Linear Bounded Automata and Context Sensitive Languages.

Undecidability : Properties of recursive and recursively enumerable languages – Turing Machine Codes – Universal Turing Machine .

UNIT V

Case Studies: Application of Finite Automata – Parsing.

TEXT BOOKS

1. John E.Hopcraft and Jeffery D. Ullman, Rajeev Motwani “Introduction to Automata theory, languages and computations” , Third Edition (2006)

REFERENCE

1. K.L.P. Mishra & N. Chandrasekaran “Theory of computer science Automata, Languages and computation” , PHI

2. DANIEL I.A. COHEN," INTRODUCTION TO COMPUTATION THEORY", JOHN WILEY & SONS, 2ND EDITION.

COMS 462:DATA COMMUNICATION NETWORKS

UNIT I

Introduction to Networks – Topology - Network Architecture - Reference Models - Example Networks – APRANET , NSFNET , Internet - Physical Layer - Transmission media – ISDN - Broadband, Narrowband.

UNIT II

The Data Link Layer : Data Link Layer design issues – Error Detection and Correction Methods - Elementary Data Link Protocols – Sliding Window Protocols – Protocol Verification Methods – Channel Allocation – Multiple Access protocols – IEEE 802 Standards.

UNIT III

The Network Layer: Network Layer design issues – Routing algorithms – Congestion Control algorithms – Internetworking – Network Layer in Internet.

UNIT IV

The Transport Protocols: Transport Service – Transport Protocols – Internet Transport Protocols UDP – TCP - Performance issues.

UNIT V

The Application Layer: Application Layer design issues – Domain Name System - Electronic Mail – World Wide Web – Multimedia - Other Applications – Network Security - Basic Cryptography - DES - RSA.

TEXT BOOK

1. Andrew S. Tanenbaum, “COMPUTER NETWORKS” , Fourth Edition, Prentice Hall India.

REFERENCE

1. William Stallings, “CRYPTOGRAPHY & NETWORK SECURITY - Principles and Practices”, Third Edition, Pearson Education.

COMS 463:SOFTWARE ENGINEERING CONCEPTS

UNIT I

Introduction, Software process, Software Process Models, CMM levels and KPAs, Linear Sequential Model, Prototype Model, RAD Model, Evolutionary Software Process Model, Analysis concepts and principles, Analysis modelling.

UNIT II

Software process and Project Metrics, Risk Management, Quality Assurance and Quality models – McCall's model, FURPS model and ISO 9126 model, Configuration management.

UNIT III

Software Design, Design Principles, Design concepts, Architectural Design, Procedural Design, Design of Real-time systems.

UNIT IV

Software Testing, Test-case Design, White Box Testing, Black Box testing, Testing GUI and Client/ Server Architecture, Testing Strategies, Unit Testing, Integration testing, Validation testing, System testing, Software Maintenance.

UNIT V

Recent trends in Software Engineering, Cleanroom Software Engineering, Re-engineering, Client/ Server Software Engineering.

TEXT BOOK

1. Roger S. Pressman, "Software Engineering a Practioner's Approach", McGramHill, Fifth Edition

REFERENCES

1. Ian Sommerville, "Software Engineering" Vth Edition, Addison Wesley Publications.

COMS 464:OBJECT ORIENTED SYSTEM DESIGN

UNIT I

Overview of Object-oriented systems development – Need for object orientation - Overview of the unified approach -Object Basics -Object-Oriented Systems Development Life Cycle – The software development process- building high-quality software- object-oriented systems development- reusability.

UNIT II

Object-Oriented Methodologies – Unified Modeling Language – Static and dynamic models- why modeling- introduction to the unified modeling language- UML diagrams- UML class diagram- Use-case diagram- UML dynamic modeling- model management- UML extensibility- UML meta-model.

UNIT III

Object-Oriented Analysis Process- identifying Use Cases – Use-case driven object-oriented analysis- business process modeling- Use-case model- Object Analysis- Classification – classifications theory- approaches for identifying classes-Identifying object relationships - identifying attributes and methods- defining attributes by analyzing use cases and other UML diagrams.

UNIT IV

The Object-Oriented Design Process and Design Axioms – the object-oriented design process- object-oriented design axioms- corollaries- Design patterns and frameworks – Describing Design patterns – Façade Design pattern. Designing Classes - the object-oriented design philosophy- UML object constraint language- designing classes- the process- class visibility- designing classes- refining attributes - designing methods and procedures-

UNIT V

Access Layer - designing access layer classes- case study -View Layer- Designing interface objects – user interface design as a creative process- designing view layer classes – User satisfaction and usability testing

Case Study - Analyzing the Bank ATM - Use-case model- developing effective documentation- Relationship analysis - defining attributes - object responsibility - defining methods for - refining attributes - designing methods - Designing the access layer - designing user interface

TEXT BOOKS

1. Ali Bahrami, “Object Oriented System Development”, McGraw Hill International Edition, 1999.
2. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, “DESIGN PATTERNS Elements of reusable Object Oriented Software”, Addison Wesley Professional Computing Series - Pearson Education -2003

COMS 465:WEB TECHNOLOGY

UNIT I

Introduction to Internet: Web Vs Internet - Internet Address, Ports, Sockets, DNS - firewall - proxy- Internet Service Provider-Internet services-protocols- Static Page Creation: HTML – Cascaded Style Sheets.

UNIT II

The Client: Introduction to Client side scripting – Javascript : Overview – Language Constructs – Window Manipulation – JavaScript Functions- Working with Forms – Cookies.

UNIT III

The Server: Introduction to server side scripting – PHP Language Basics – OOP with PHP – Session Management – Reporting – Database manipulation with PHP and MySql - Authentication and Security.

UNIT IV:

The XML : Introduction – XML syntax – DTD – XML Schema – XML parsers – SOAP – Creating simple web services.

UNIT V

AJAX : Introduction – Creating and sending requests- XML in Javascript and AJAX – Server side AJAX.

TEXT BOOKS

1. Web Publishing with HTML4, Laure Lemay, Techmedia, First Edition.
2. “Commercial Web Development “, Ivan Bayross.
3. The book of JavaScript : a practical guide to interactive Web pages Thau -- 2nd ed.
4. Web Database Application with PHP and MySQL, 2nd Edition By David Lane, Hugh E. Williams
5. XML – How to program by Deital and Deital, Pearson Education, 2001.

COMS 511:PRINCIPLES OF COMPILER DESIGN

UNIT I ELABORATE ON SYSTEM SOFTWARE

Introduction to Compilers: Compilers and Translators, structure of a Compiler, Compiler Writing tools, Lexical and syntactic structure of a language - Finite Automata and Lexical Analysis, Role of a lexical analyzer.

UNIT II

Syntactic specification of programming languages : Context free grammars, derivations and parse trees, capabilities of context free grammars Basic Parsing techniques: Shift reduce parsing – Operator precedence parsing – Top-Down Parsing - Predictive Parsers – Automatic Construction of efficient Parsers

UNIT III

LR Parsers – Constructing SLR – Canonical LR and LALR Parsing Tables – Using Ambiguous Grammars – Automatic Parser Generator – Implementation of LR Parsing Tables. **Syntax Directed Translation:** Schemes – Implementation – Intermediate Code – Postfix Notation – Parse Tree and Syntax Trees – Three Address Code – Quadruples and Triples – Translation of Assignment Statements – Boolean Expression – Postfix Translations – Translation with a Top-Down Parser.

UNIT IV

Symbol Tables, Contents data structures, representing scope information. Run-Time Storage administration, Implementation and storage allocation of simple stack allocation schemes and block structured languages, Error detection and recovery, Lexical Phase Errors, Syntactic Phase errors, Semantic Errors.

UNIT V

Introduction to Code Optimization, Principle Sources of optimization, Loop Optimization, DAG Representation of basic blocks, Global Data Flow Analysis, Code Generation, Problems in code generation Register allocation and assignment, Code Generation from DAG's, Peephole Optimization.

TEXT BOOK

1. Alfred Aho, Jeffrey D.Ullman "Principles of Compiler Design", Narosa 25th reprint.
2. Beck

REFERENCE

1. Alfred Aho, Jeffrey D.Ullman, Ravi Sethi "Compiler Design-Principles Techniques and Tools", 16th reprint, Pearson Education.

COMS 518:COMPILER DESIGN LAB

1. Simulation of Lexical Analyser
2. Regular Expression to NFA Conversion
3. Parser implementation – Recursive Decent, Shift Reduce, Predictive parsers
4. Simple Intermediate Code Generation - Quadruples / Triples generation
5. Developing applications with LEX and YACC Ex. Calculator generation
6. Dynamic Storage Allocation and Overloaded functions

COMS 512:COMPUTER GRAPHICS

UNIT I

Introduction, Overview of Graphics Systems, Video Display Devices, Refresh Cathode Ray Tubes, Raster Scan and Random Scan Displays, Raster Scan and Random Scan Display Processor, Color CRT Monitors, DBST, 3D Viewing Devices, Stereoscopic and VR Systems, Input Devices, Hard Copy Devices.

UNIT II

Output primitives, Line drawing algorithms, Circle Drawing algorithms, Circle drawing algorithms, Polynomials and spline curves, Area filling algorithms, character generation, Attributes of Output primitives, Line, Curve, Area fill, Character and bundled attributes, Anti aliasing techniques.

UNIT III

2D Transformations, 2D viewing, Graphical User interfaces and Interactive Input Methods.

UNIT IV

3D Concepts, 3D Object representations, 3D Transformations, 3D Viewing .

UNIT V

Visible Surface Detection Methods.

TEXT BOOK

1. Donald Hearn and M. Pauline Baker, “Computer Graphics”, 2nd Edition, Prentice Hall of India.

REFERENCES

1. Steven Harrington, “Computer Graphics – Programming Approach”, McGraw Hill.
2. Roy A. Plastock and Gordon Kelley, “Theory and Problems of Computer Graphics”, Schaum’s Outline Series, McGraw Hill.

COMS 513:CRYPTOGRAPHY AND NETWORK SECURITY

UNIT I

Symmetric Ciphers – Classical Encryption Techniques – Symmetric Cipher Model , Substitution Techniques , Transposition Techniques , Steganography – Block Ciphers and the Data Encryption Standard – Simplified Data Encryption Standard , Block Cipher Principles , The Data Encryption Standard, Strength of Data Encryption Standard, Differential and Linear Cryptanalysis , Block Cipher Design Principles , Block Cipher Modes of Operation.

UNIT II

Advanced Encryption Standard – Evaluation Criteria for Advanced Encryption Standard , The Advanced Encryption Standard Cipher – Substitute Byte Transformation – Contemporary Symmetric Ciphers – Triple Data Encryption Standard , Blowfish ,RC5 , Characteristics of Advanced Symmetric Block Ciphers – Confidentiality using Symmetric Encryption – Key Distribution.

UNIT III

Public Key Cryptography and RSA – Principles – RSA Algorithm, Key Management and other Public Key Cryptosystems – Key Management , Diffie-Hellman Key Exchange , Elliptic Curve Cryptography , Manage Authentication and Hash Functions – Authentication Requirements ,Authentication Functions , Manage Authentication Codes.

UNIT IV

Digital Signatures and Authentication Protocols – Digital Signatures , Authentication Protocols , Digital Signature Standard.

UNIT V

Network Security Practice – Authentication Applications – Kerberos , X.509 Authentication Service – Electronic Mail Security – PGP , Secured MIME, IP Security – Overview , IP Security Architecture , Authentication Header , Encapsulation Security Payload.

TEXT BOOK

1. William Stallings, “CRYPTOGRAPHY & NETWORK SECURITY - Principles and Practices”, Third Edition , Pearson Education.

COMS 461:UNIX AND SHELL PROGRAMMING

Unit I

Introduction - Features - System structure - Shell & its features - Kernel - Architecture of the UNIX OS - Kernel Data Structure - Overview - Logging in & out - I node and file structure - File system structure and features - Booting sequence & init process.

Unit II

Unit File Hierarchy Concepts - Some Important Directories - Directory Management – File Management – Access Permissions – Mounting – Archiving - Process Management : Listing – Finding – Sending Signals – Priority – Crontab.

Unit III

Shell Programming - Environmental & user defined variables - Argument processing - Shell's interpretation at prompt - Arithmetic expression evaluation - Control structure - Redirection - Background process & priorities of process - Conditional execution - Parameter & quote substitution - Text editor

Unit IV

Advanced shell programming - Filtering units - Awk - Batch process - Splitting, comparing, sorting. Merging & ordering files - Communications with other users - Spooling & Print Management - Backup & Recovery.

Unit V

Memory management - Swapping - Demand paging - Memory management - TCP/IP Network Configuration, Managing Ethernet Connections, Graphical Network - Configuration, Network Configuration Files, Managing Services.

Text Books

1. Maurice J. Bach, “Design of the Unix Operating System”, Third Edition, 2000, PHI.
2. Sumitabha Das, “Unix : Concepts and Applications”, Third Edition, 2006, Tata McGraw Hill
ISRD Group,
3. Basics of OS, UNIX and SHELL Programming” TMH (2006)

Reference Books

1. Stephen Prata “Advanced Unix -A programmer's Guide.

COMS 527:PRINCIPLES OF PROGRAMMING LANGUAGES

UNIT I

The challenge of programming language design: Criteria for language design-some possible solutions. Defining syntax: General problem of describing syntax, formal methods of describing syntax, BNF, Syntax Graphs. Syntax and program Reliability.

UNIT II

Variables, Expressions and statements: Variables and assignment statement, Binding Time and Storage Allocation, Constants and initialization, Expressions, Statements- Conditional, Iteration. GOTO and Labels. **Types:** Data types and Typing. Enumerated and elementary, pointer, structured Data types, Type coercion & Equivalence. **Scope and Extent:** Basics, Runtime implementation, an extended Example, Binding, scope & Extent.

UNIT III

Procedures: General features, Parameter evaluation & passing, Call-By-Name, Specification of objects in a procedure, aliasing, Overloading, Generic functions, Coroutines. **Abstract data types:** concept of abstraction, Encapsulation, Introduction to data abstraction, design issues, parameterized abstract data types.

UNIT IV

Exception Handling: Introduction, Exception Handling in PL/I, Exception Handling in Ada, Exception Handling in C++. **Concurrency:** Basic concepts, subprogram-level concurrency, statement-level concurrency, semaphore, Monitors, Message passing.

INPUT-OUTPUT.

UNIT V

CASE STUDIES: Functional programming Languages- Introduction- Mathematical functions- fundamentals of functional programming languages –the first functional programming language LISP - Application of functional languages- **Logic programming Languages** – Introduction to predicate Calculus- An overview of logic programming- Applications of logic programming - **Object-oriented programming Languages** - Introduction – Object oriented programming- Support for object oriented programming in C++.

TEXT BOOKS

1. Ellis Horowitz, “Fundamentals of programming Languages”, Galgotia Publications, 1998
2. Robert W. Sebesta, “Concepts of programming Languages”, Addison-Wesley , 1996.

COMS 528:MIDDLEWARE TECHNOLOGIES

UNIT I

Client – Server – File Server, Data Base Server, Group Server, Object Server, Web Server
Middleware – General Middleware – Service Specific Middleware - Client – Client Server
Building blocks – RPC – Messaging – Peer-to-Peer

UNIT II

EJB – EJB Architecture – Overview of EJB Software Architecture – View of EJB
Conversation – Building and Deploying EJBs – Roles in EJB

UNIT III

EJB Session Beans – EJB Entity Beans – EJB Clients – EJB Deployment – Building an
Application with EJB

UNIT IV

CORBA – Distributed Systems – Purpose – Exploring CORBA alternatives – Architecture
Overview – CORBA and Networking Model – CORBA Object Model – IDL – ORB –
Building an Application with CORBA

UNIT V

COM – Data Types – Interfaces – Proxy and Stub – Marshalling – Implementing Server/Client
– Interface Pointers – Object Creation, Invocation, Destruction – Comparison of COM and
CORBA

TEXT BOOKS

1. Robert Orfali, Dan Harkey, Jeri Edwards, '*The Essential Client/Server Survival Guide*', Galgotia Publication Pvt. Ltd., 2002.
2. Tom Valesky, '*Enterprise JAVA Beans*', Pearson Education, 2002.
3. Jeremy Rosenberger, '*Teach Yourself CORBA in 14 days*', Techmedia, 2000.
4. Jason Pritchard, '*COM and CORBA side by side*', Addison Wesley, 2000.

REFERENCES

- Mowbray, '*Inside CORBA*', Pearson Education, 2002.

COMS 530: MULTIMEDIA SYSTEMS AND APPLICATIONS

UNIT I

Introduction: Multimedia elements – multimedia applications – System architecture – evolving technologies – defining objects – data interface standards – need for data compression – multimedia databases

UNIT II

Multimedia data compression: Types of compression – Binary image compression – color, gray scale and still video image compression – video image compression – audio compression – fractal compression. Data and file formats: RTF – TIFF – RIFF, MIDI, JPEG, AVI video file formats, MPEG standards.

UNIT III

Multimedia I/O technologies: Pen input – Video and Image display systems – Print output technologies image scanners – digital voice and audio – digital camera – Video images and animation – full motion video. Multimedia storage and retrieval technologies: magnetic media technology – optical media – hierarchical storage management – cache management for storage systems.

UNIT IV

Multimedia application design: Types of Multimedia systems – Virtual reality design – components of multimedia systems – organizing multimedia databases – application work flow design issues. Multimedia authoring systems: Hypermedia application design considerations – user interface design – information access – object display / playback issues.

UNIT V

Distributed Multimedia Systems: Components – Distributed Client-Server operation – multimedia object servers – Multi-Server network topologies – Distributed multimedia databases – Managing distributed objects.

TEXT BOOKS

1. Prabhat K. Andleigh, Kiran Thakrar, “*Multimedia Systems Design*”, PHI 2002.

REFERENCES

1. Tay Vaughan, “*Multimedia making it works*” Fifth Edition, TMH, 2001.
2. Jeffery Jefcoat, “*Multimedia Systems and Application*”, TMH.
3. Fred Halsall, “*Multimedia Communication Application Networks, Protocols and Standards*”, Addison Wesley, 2001.

COMS 531:E-COMMERCE

UNIT I

Electronic Commerce Environment and Opportunities: Background – The Electronic Commerce Environment – Electronic Marketplace Technologies – Modes of Electronic Commerce: Overview – Electronic Data Interchange – Migration to Open EDI – Electronic Commerce with WWW / Internet – Commerce Net Advocacy – Web Commerce going forward

UNIT II

Approaches to safe Electronic Commerce: Overview – Secure Transport Protocols – Secure Transactions – Secure Electronic Payment Protocol(SEPP) – Secure Electronic Transaction (SET)- Certificates for Authentication – Security on Web Servers and Enterprise Networks – Electronic cash and Electronic payment schemes: Internet Monetary payment and security requirements – payment and purchase order process - Online Electronic cash

UNIT III

Internet/Intranet Security issues and solutions: The need for Computer Security – Specific Intruder Approaches – Security strategies – Security tools – Encryption – Enterprise Networking and Access to the Internet – Antivirus programs – Security Teams.

UNIT IV

MasterCard / Visa secure Electronic Transaction: Introduction – Business Requirements – Concepts – Payment processing – E-mail and secure e-mail technologies for electronic commerce:Introduction – The Mean of Distribution – A model for message handling – How does e-mail work? MIME: Multipurpose Internet Mail Extensions – S/MIME: Secure Multipurpose Internet Mail Extensions – MOSS: Message Object Security Services

UNIT V

Internet and Web site establishment: Introduction – Technologies for web servers – Internet tools relevant to Commerce – Internet Applications for Commerce – Internet charges – Internet Access and Architecture – Searching the Internet

TEXT BOOKS

1. Daniel Minoli & Emma Minoli, “Web Commerce Technology Handbook”, TataMcGraw-Hill .
2. K.Bajaj & D. Nag, “E-Commerce”, TataMcGraw-Hill.

COMS 532:NEURAL NETWORKS

UNIT I

Introduction, Characteristics of Artificial Neural Networks, Learning in Biological systems and machines, Brain and Computers, Differences in simple neurons.

UNIT II

Perceptron and representation, Learning , Linear separability, Problems with the perceptron training algorithms, Multilayer perceptron, Back propagation training algorithm, Learning difficulties, Applications.

UNIT III

Counter propagation networks, Normal operation, training, Full counter propagation networks, Applications to data compression, Khonen network algorithm, Neighborhoods. Hopfield Nets, Learning, The energy landscape, Storing and recall of patterns, Learning in Boltzman machines, Learning , Applications.

UNIT IV

Statistical methods, Training, Application to general non-Linear optimization problem. Adaptive Resonance Theory, Architecture, Classification, Implementation, Training aids, Characteristics.

UNIT V

Associative memory, Bi-directional associative memory, Structure of types. Optical Neural Networks, Vector matrix multipliers, Holographic correlators, Hopfield net using electro optical matrix multipliers and volume holograms. The cognitron structure, Training, Lateral inhibition, The NeoCognitron structure, Generalization, Training, Application of Neural nets, Pattern Recognition, Decision making system, Medical diagnosis. Recent trends in Neural Nets.

TEXT BOOK

1. Philip D Wasserman, “Neural Computing – Theory and Practice”, Van Nostrand and Reinhold, 1989.

REFERENCE

1. James A Freeman and David M Skapura, “Neural Networks Algorithms, Application and Programming Techniques”, Addison Wesley Publishing Company, 1991.

COMS 533:.NET FRAMEWORK AND C#

UNIT I

Introduction to the .NET Platform – Common Language Runtime(CLR) – The Common Type Specification(CTS) – The Common Language Specifications (CLS) – Assemblies - .NET Base Classes – CLR Debugger.

UNIT II

Introduction to C# - Data Type – Operators – Flow Control and Iteration – Arrays and Strings – Basics of C# Classes – Boxing and Unboxing – Reflection – Interoperability – The Preprocessors – Attributes – Name Spaces.

UNIT III

Object-Oriented Programming in C# - Encapsulation, Inheritance, and Polymorphism – Exception Handling – Garbage Collection – Interfaces – Delegates and Events – Multithreading and Synchronization – Type Reflection and Attributes.

UNIT IV

Introducing Windows Forms - GDI+ - Programming with Windows Forms Controls - The System.IO Namespace - Data Access with ADO.NET.

UNIT V

Introduction to ASP .NET: Web Forms - Server Controls – Data Access – LINQ – Security.

TEXTBOOKS

- 1.Robert J.Oberg, “Introduction to C# using .NET”,PHI,2002.
- 2.Andrew Troelsen, “C# and .NET Platform”,Apress, 1st edition,2001.
3. Pro ASP.NET 3.5 in C# 2008, Second Edition By Matthew MacDonald and Mario Szpuszta.

COMS 538:DISTRIBUTED DATABASE SYSTEMS

UNIT I

Introduction : Distributed data processing, distributed database design, distributed query processing, distributed directory management, distributed concurrency control, distributed deadlock management, reliability of distributed DBMS, operating system support, heterogeneous databases. Overview of Relational DBMS

UNIT II

Review of computer networks: Data communication concepts, types of networks, protocol standards, broadband networks, wireless networks, Internet. Distributed DBMS Architecture : DBMS standardization, architectural model for distributed DBMS, Distributed DBMS Architecture : client/server systems, peer-to-peer distributed systems.

UNIT III

Distributed Database Design: Alternative design strategies: top-down design process, bottom-up design process, distribution design issues: reasons for fragmentation, fragmentation alternatives, degree of fragmentation, correctness rules of fragmentation, allocation alternatives, information requirements, fragmentation: horizontal fragmentation, vertical fragmentation, hybrid fragmentation. Semantic data control : View management: views in centralised DBMS, updates through views, views in distributed DBMS. Data security : centralized authorization control, distributed authorization control.

UNIT IV

Distributed Concurrency Control : Locking-based concurrency control algorithm, timestamp-based concurrency control algorithms : basic TO algorithm, conservative TO algorithm, optimistic concurrency control algorithms. Deadlock management : deadlock prevention, deadlock avoidance, deadlock detection and resolution. Distributed DBMS Reliability : System, state and failure, reliability and availability, mean time between failures/mean time to report, failure and fault tolerance in distributed systems : reasons for failures, basic fault tolerance approaches and techniques.

UNIT V

Distributed Object Database Management: Object, abstract data types, composition, class, collection, subtyping and inheritance, Object distribution design : horizontal class partitioning, vertical class partitioning , path partitioning, class partitioning algorithms, allocation, replication.

TEXT BOOK

1. M.Tamer Ozsü-Patric Valduriez, "Principles of Distributed Database System" II Edition, Pearson Education.

COMS 540:ARTIFICIAL INTELLIGENCE

UNIT-I

Introduction : Intelligent Agents – Search Strategies – Solving Problems by Searching – Breadth-First – Depth-First – Depth-Limited – Iterative Deepening – Bidirectional – Informed Search Methods – A* - AO* - Games as Search Problems – Alpha-Beta Pruning.

UNIT-II

Representation: Propositional Logic – First – Order Logic –Frame Systems and Semantic Networks.

UNIT-III

Reasoning: Inference in First-Order Logic – Forward and Backward Chaining – Resolution – Unification- Logical Reasoning Systems.

UNIT-IV

Planning: Simple Planning Agent – From Problem Solving to Planning – Basic Representations for Planning – Practical Planners – Hierarchical Decomposition – Resource Constraints – Uncertainty – Probabilistic Reasoning Systems.

UNIT-V

Learning: General Model of Learning Agents – Inductive Learning - Computational Learning Theory – Learning in Neural and Belief Networks – Reinforcement Learning – Types of Communicating Agents – Robotics: Tasks, Parts, Configurations Spaces, Navigation and Motion Planning.

TEXTBOOKS

1. Stuart J.Russell and Peter Norvig, “Artificial Intelligence”, Tata Mc Graw Hill Publisher – 2nd Edition.

REFERENCES

1. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata Mc Graw Hill Publisher-2nd Edition.
2. Dan W.Patterson, “Introduction to Artificial Intelligence and Expert Systems”, Prentice Hall of India.

COMS 541:FUNDAMENTALS OF AGENT TECHNOLOGY

Unit I

Introduction – Intelligent Agents – Environments – Intelligent agents – Agents and Objects – Agents and Expert Systems – Agents as Intentional Systems – Abstract Architectures for Intelligent Agents – How to tell an agent what to do – Synthesizing Agents

Unit II

Deductive Reasoning Agents – Agents as Theorem Provers – Agent-Oriented Programming
Practical Reasoning Agents – Proactical Reasoning Equals Deliberation Plus Means-Ends Reasoning – Means-Ends Reasoning – Implementing a Practical Reasoning Agent
Reactive and Hybrid Agents- Brooks and the Subsumption Architecture – The Limitations of Reactive Agents – Hybrid Agents

Unit III

Multiagent Interactions – Utilities and Preferences – Multiagent Encounters – Dominant Strategies and Nash Equilibria – Competitive and Zero-Sum Interactions – The Prisoner's Dilemma – Other Symmetric 2 x 2 Interactions – Dependence Relations in Multiagent Systems
Reaching Agreements – Mechanism Design – Auctions – Negotiation – Argumentation
Communication – Speech Acts – Agent Communication Languages – Ontologies for Agent Communication – Coordination Languages

Unit IV

Cooperative Distributed Problem Solving – Task Sharing – Combining Task and Result Sharing – Handling Inconsistency – Coordination – Multiagent planning and Synchronization

Unit V

Methodologies – Agent-Oriented Analysis and Design Techniques – Pitfalls of Agent Development – Mobile Agents - Applications of Agents

Text Book

1. Michael Wooldridge, An Introduction to Multiagent Systems, John Wiley & Sons Ltd.2002.

References

1. Gerhard Weiss, Multi-agent Systems – A Modern Approach to Distributed Artificial Intelligence, MIT Press
2. Walter Brenner et al, Intelligent Software agents, Springer Verlag
3. Nicholas R. Jennings, Michael Wooldridge, Agent Technology: Foundations, Applications and markets, Springer Verlag Publishing.

COMS 544:SOFTWARE TESTING AND QUALITY ASSURANCE

UNIT I

SOFTWARE TESTING TECHNIQUES: Software Testing Fundamentals, Psychology of testing - Testing economics, White box testing techniques, Black box testing techniques - Weyuker's adequacy axioms.

UNIT II

SOFTWARE TESTING STRATEGIES: SDLC and Testing, Strategic Approach to Software Testing, Unit Testing, Integration Testing, validation Testing, System Testing, The art of debugging, Testing Maturity Models – TMM and TMMI.

UNIT III

TESTING OBJECT ORIENTED SOFTWARE: Challenges - Differences from testing non-OO Software - Class testing strategies - Class Modality - State-based Testing - Message Sequence Specification, Difference between design based and code testing, Interdependency Testing Models in OO software.

UNIT IV

Introduction to Quality and Quality Control - Evolution of Quality Control - Quality assurance - Quality circles and Quality improvement teams - Benefits of Quality control- Quality and Reliability - Quality costs - Measuring Quality costs - Total Quality Management, Quality Metric Models - McCall's model, FURPS model and ISO 9126 model.

UNIT V

CMM Model and its stages - Introduction to PCMM, CMMI and Six Sigma concepts. Introduction to ISO 9000, ISO 9000 – Part3 for software Quality.

TEXT BOOKS

1. Roger S. Pressman, “ Software Engineering. A Practitioners Approach”, Fifth Edition, 2001
2. William E.Perry, " *Effective Methods for Software Testing (2nd Edition)* ", John Wiley & Sons, 2000.
3. Robert V.Binder, " *Testing Object-Oriented Systems: Models Patterns and Tools* ", Addison Wesley, 2000.
- 4.Rajneesh Kapur, "Getting ISO 9000 in a software organization", By BPB Publications.
- 5.Allan C Gillies, “ Software Quality theory and management”, Thompson learning.
- 6.Stephen H. Kan, “Metrics and Models in Software Quality Engineering”, Pearson Education.

REFERENCES

1. Glenford J.Myers, "*The Art of Software Testing* ", John Wiley & Sons, 1997.

COMS 546: DATA MINING AND WAREHOUSING

UNIT I

Evolution of database technology – Introduction to data warehousing and data mining - Differences between operational databases and data warehouses.

UNIT II

Data warehouse architecture & design, Hardware & Operational design, Tuning and testing.

UNIT III

Data mining: Data preprocessing, data mining primitives, languages & system architectures, concept description: characterization and comparison, Mining association rules, classification and prediction.

UNIT IV

Cluster analysis, Applications and trends in data mining.

UNIT V

Introduction to Microsoft's OLE DB for Data mining, DBMiner.

TEXTBOOKS

1. Sam Anahory and Dennis Murray, "Data Warehousing in the real world", Addison Wesley 1997.
2. Jiawei Han et, al., "Data Mining: Concepts and Techniques", Morgan Kaufmaan series , 2000.

REFERENCES

1. Usama M.Fayyad, Gregory Piatetsky - Shapiro, Padhrai Smyth and Ramasamy Uthurusamy, "Advances in Knowledge Discovery and Data Mining", The M.I.T Press, 1996.
2. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", John Wiley & Sons Inc., 1998.
3. Sean Kelly, "Data Warehousing in Action", John Wiley & Sons Inc., 1997

COMS 550:NATURAL LANGUAGE PROCESSING

Unit – I

Introduction – Knowledge in Speech and Language Processing – Ambiguity – Models and Algorithms – Language, Thought, and Understanding – The State of the Art and the Near term Future – Some Brief History.

Unit – II

Morphology and Finite-State Transducers – Survey of English Morphology – Inflectional Morphology – Derivational Morphology – Finite-State Morphological Parsing – The Lexicon and Morphotactics – Morphological Parsing with Finite-State Transducers – Orthographic Rules and Finite-State Transducers – Combining FST Lexicon and Rules – Lexicon-Free FSTs: The Porter Stemmer – Human Morphological Processing.

Unit – III

Word Sense Disambiguation and Information Retrieval – Selection Restriction-Based Disambiguation – Limitations of Selectional Restrictions – Robust Word Sense Disambiguation – Machine Learning Approaches – Dictionary-Based Approaches – Information Retrieval – The Vector Space Model – Term Weighting – Term Selection and Creation – Homonymy, Polysemy, and Synonymy – Improving User Queries – Other Information Retrieval tasks.

Unit – IV

Discourse – Reference Resolution – Reference Phenomena – Syntactic and Semantic Constraints on Coreference – Preferences in Pronoun Interpretation – An Algorithm for Pronoun Resolution – Text Coherence – The Phenomenon – An Inference Based Resolution Algorithm – Discourse Structure.

Unit – V

Machine Translation – Language Similarities and Differences – The Transfer Metaphor – Syntactic Transformations – Lexical Transfer – The Interlingua Idea: Using Meaning – Direct Translation – Using Statistical Techniques – Quantifying Fluency – Quantifying Faithfulness – Search – Usability and System Development.

Text Book

Daniel Jurafsky and James H. Martin, *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition*, Pearson Education, 2002.

Reference

Bharathi, A., Vineet Chaitanya and Rajeev Sangal. 1995. *Natural Language Processing- A Paninian Perspective*. Prentice Hall India, Eastern Economy Edition.

COMS 551:MICROPROCESSOR ARCHITECTURE

Unit I

Introduction to the Microprocessor : History - Microprocessor-Based Personal Computer System - Number Systems - Computer Data Formats - **Architecture & Addressing** : Microprocessor Architecture - Real Mode Memory Addressing - Protected Mode Memory Addressing - Memory Paging - Addressing modes.

Unit II

8086/8088 : Pin-outs and Pin Functions - Clock Generator (8284A) - Bus Buffering and Latching - Bus Timing - Ready and the Wait State - Minimum Mode Verse Maximum Mode .ALP Instructions : Data Movement – Arithmetic and Logic – Program Control. Assembly language With C/C++ .

Unit III

Memory Interface : Memory Devices - Address Decoding - 8088 and 80188 (8-bit) Memory Interface - Dynamic RAM. Basic I/O Interface : Introduction to I/O Interface - I/O Port Address Decoding - The Programmable Peripheral Interface - The 8279 Programmable Keyboard/Display Interface - 8254 Programmable Interval Timer - Analog-to-Digital (ADC) and Digital-to-Analog (DAC) Conversions

Unit IV

Interrupts : Basic Interrupt Processing - Hardware Interrupts - Expanding the Interrupt Structure - 8259A Programmable Interrupt Controller - Interrupt Examples . Direct Memory Access and DMA-Controlleed I/O : Basic DMA Operation - The 8237 DMA Controller - Shared-Bus Operation - Disk Memory Systems - Video Displays. Bus Interface : The ISA Bus - The Peripheral Component Interconnect (PCI) Bus - The Parallel Printer (LPT1) Interface - The Serial COM Ports - The Universal Serial Bus (USB) - Accelerated Graphics Port (AGP).

Unit V : 80186, 80188, and 80286 - The Pentium and Pentium Pro Microprocessors.

TEXT BOOKS

1. Barry B. Brey, “The Intel Microprocessors 8086/8088,80186/80188,80286,80386, 80486, Pentium & Pentium Pro processors”, Seventh Edition.

REFERENCES

Gaonkar, “Microprocessor Architecture, Programming and Applications”, Wiley Eastern Ltd., 1987.

COMS 552:DECISION SUPPORT SYSTEM

UNIT I

Decision making, Systems, Modeling, and support – Introduction and Definition – Systems – Models – Modeling process – Decision making: The intelligence phase – The design phase - The choice phase – Evaluation: The implementation phase –Alternative Decision – Making models – Decision support systems – Decision makers - Case applications.

UNIT II

Decision Support System Development: Introduction - Life cycle – Methodologies – prototype – Technology Levels and Tools – Development platforms – Tool selection – Developing DSS Enterprise systems: Concepts and Definition – Evolution of information systems – Information needs – Characteristics and capabilities – Comparing and Integrating EIS and DSS – EIS data access, Data warehouse , OLAP, Multidimensional analysis, Presentation and the web – Including soft information enterprise on systems - Organizational DSS – supply and value chains and decision support – supply chain problems and solutions – computerized systems MRP, ERP, SCM – frontline decision support systems.

UNIT III

Introduction – Organizational learning and memory – Knowledge management – Development –methods, Technologies, and Tools – success –Knowledge management and Artificial intelligence – Electronic document management.

Knowledge acquisition and validation: Knowledge engineering – Scope – Acquisition methods - Interviews – Tracking methods – Observation and other methods – Grid analysis

UNIT IV

Inference Techniques: Reasoning in artificial intelligence – Inference with rules: The Inference tree – Inference with frames – Model-based and case-based reasoning - Explanation and Meta knowledge – Inference with uncertainty – Representing uncertainty – Probabilities and related approaches – Theory of certainty – Approximate reasoning using

UNIT V

Implementing and integrating management support systems – Implementation: The major issues - Strategies – System integration – Generic models MSS, DSS, ES – Integrating EIS, DSS and ES, and global integration – Intelligent DSS – Intelligent modeling and model management – Examples of integrated systems – Problems and issues in integration.

TEXT BOOK

Efrain Turban, Jay E.Aronson, “Decision Support Systems and Intelligent Systems” 6th Edition, Pearson Education, 2001.

COMS 553:SOFT COMPUTING

Unit I

ARTIFICIAL NEURALS : Basic-concepts-single layer perception-Multi layer perception-Supervised and un-supervised learning back propagation networks, Application

Unit II

FUZZY SYSTEMS: Fuzzy sets and Fuzzy reasoning-Fuzzy matrices-Fuzzy functions-decomposition-Fuzzy automata and languages- Fuzzy control methods-Fuzzy decision making, Applications

Unit III

NEURO-FUZZY MODELLING: Adaptive networks based Fuzzy interfaces-Classification and Representation trees-Data dustemp algorithm –Rule base structure identification-Neuro-Fuzzy controls

Unit IV

GENETIC ALGORITHM: Survival of the fittest-pictures computations-cross over, mutation-reproduction-rank method-rank space method, Application

Unit V

SOFT COMPUTING AND CONVENTIONAL AI: AI Search algorithm-Predicate calculus-rules of interface - Semantic networks-frames-objects-Hybrid models applications

References:

1. Jang J.S.R., Sun C.T and Mizutami E - *Neuro Fuzzy and Soft computing* Prentice hall New Jersey, 1998
2. Timothy J. Ross: *Fuzzy Logic Engineering Applications*. McGraw Hill, New York, 1997.
3. Laurene Fauseett: *Fundamentals of Neural Networks*. Prentice Hall India, New Delhi, 1994.
4. George J. Klir and Bo Yuan, *Fuzzy Sets and Fuzzy Logic*, Prentice Hall Inc., New Jersey, 1995
5. Nih. J. Ndssen *Artificial Intelligence*, Harcourt Asia Ltd., Singapore, 1998.

COMS 554: PRINCIPLES OF DISTRIBUTED SYSTEMS

UNIT I

Definition-Goals-Hardware and Software Concepts – Client/Server Model Communication - Layered Protocols – RPC-Remote Object Invocation – Message Oriented Communication

UNIT II

Threads – Client –Server – Code Migration –S/W Agents Naming Entity – Location Mobile Entity

UNIT III

Synchronization- Clock Synchronization-Logical Clocks- Global States-Election Algorithms- Mutual Exclusion – Distributed Transaction Consistence and Replication - Introduction- Data Centric Consistence- Fault Tolerance- Reliable Client/Server Communication- Distributed Commit – Recovery

UNIT IV

Distributed Object Database System CORBA – DCOM - GLOBE.

UNIT V

Distributed File System- Distributed Document Base System-WWW-Distributed Co-ordination Base System- JINI

TEXT BOOKS

1. Andrew S.Tanenbaum, Maarten van Steer "Distributed Systems – Principles and Paradigms", 2002, Prentice Hall India.

REFERENCE

1.George Coulouris, Jean Dollomere and Tim Kinderberg, “ Distributed Systems : Concepts and Design”, Addison Wesley.

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