SYLLABUS OF VIII SEMESTER B.E. COMPUTER SCIENCE (SEMESTER PATTERN)

88CS1: Distributed And Object Oriented Database Management

UNIT 1

Distributed Databases

Distributed Databases: What and Why? ; the Distributed Database Management Systems.

The Distributed Transparency - - the Reference Architecture for Distributed Databases, Data Fragmentation, Distributed Transparency for Read-Only and Applications, Distributed Database Access Primitives, Integrity Constraints in Distributed Databases.

UNIT 2:

Distributed Database Design

Framework for Distributed Database Design, the Database Fragmentation Design, Allocation of Fragments.

Translation of Global Queries to Fragment Queries

The Equivalence Transformation for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.

UNIT 3:

 Optimization Of Access Strategies

Framework for Query Optimization, Join Queries - - use of Semi-Join Programs for Join Queries, the SDD-l Algorithm, the AHY approach, Use of Join as Query Processing Tactic; General Queries - - Effect of Commuting Joins and Unions, Methods for the Optimization of General Queries. The Management of Distributed Transactions

The Framework for Transaction Management; Atomicity of Distributed Transactions; Concurrency Control for Distributed Transactions; Architectural Aspects of Distributed Transactions.

UNIT 4:

Concurrency Control Foundations of Distributed Concurrency Control; Distributed Deadlocks; Concurrency Control based on Timestamps; Optimistic Methods for Concurrency Control.Distributed Database AdministrationCatalog Management in Distributed Databases, Authorization and Protection.The System R * The Architecture of System R*; Compilation, Execution and Recompilation of Queries; Protocols for Data Definition and Authorization in R*, Transaction and Terminal Management.

UNIT 5:

The Object Oriented Databases Object Oriented Databases - What and Why? ; the Object Oriented Database Management Systems; Evolution of Object Oriented Concepts; Characteristics of an Object Oriented Data Model; Object Schema; Inter-object Relationships; Late and Early Binding; Similarities and differences between bject Oriented Database Models and other Data models.

Object Oriented DBMS Architectural Approaches The Extended Relational Model Approach; Semantic Database Approach; Object Oriented Programming Language Extension Approach; DBMS Generator Approach; the Object Definition Language and the Object Query Language.

UNIT 6:

The Object Oriented DBMS Architectures; Performance Issues in Object Oriented DBMS; Application Selection for Object Oriented DBMS; the Database Design for an Object Relational DBMS. The Structured Typed and ADTs; Extending the ER Model; Storage and Access Methods; Query Processing; Query Optimization; Design and Architecture of POSTGRES; Distributed Computing in CORBA and EJB.

(Practical Implementation in Oracle 8i or Oracle 9i covering both Distributed and Object Oriented Databases Features)

Textbooks:
- Distributed Databases - Principles and Systems; Stefano Ceri, Guiseppe Pelagatti; Tata McGraw Hill; 1985.
- Object Oriented Database Systems - Approaches and Architectures; C. S. R. Prabhu; Prentice Hall of India.
- Database Systems- Design, Implementation and Management; Peter Rob, Carlos Coronnel; Course Technology; 2000.

Reference:
- Principles of Distributed database systems by M.T. Ozsu/S. Sridhar, Pearson education
- Database Management Systems; Raghu RamaKrishnan, Johnaas Gehrke; Tata McGrawHill; 2000.
- Fundamentals of Database Systems - Third Edition; Elmasri, Navathe; Addison-Wesley;2002.
- Databases- Principles, Programming and Performance; Second Edition; Patrick O'Neil,
- Elizabeth O'Neil; Morgan Kaufmann; 2002.
- Oracle 8i - DBA Handbook; Loney, Koch; Tata McGraw Hill. 5. Oracle 9i - The Complete Reference; Tata McGraw Hill- Oracle Press; 2004.

88CS2: Computer System Security

UNIT 1

Introduction to the concepts of security : need, principles, Types of Attacks , Services , Mechanisms, A model for network security , Encryption model Classical encryption techniques: substitution techniques, Transposition techniques, Rotor Machines, Steganography.

Block ciphers : simplified DES , Block cipher principles , Data encryption standard , Strength of DES , Block cipher design principles , Block cipher mode of operation, Characteristics of advanced symmetric block ciphers.

 UNIT 2

Confidentiality using symmetric Encryption : Placement of encryption function , Traffic confidentiality , Key distribution , Random number generation ,
Public key cryptography : Principles , RSA algorithm , Key management , Diffie-Hellman key exchange

UNIT 3
Message authentication & Hash functions : Authentication requirements , Functions , Codes , Hash functions , Security of hash function & MAC's. Hash algorithms : MD5 message digest algorithm , Secure hash algorithm(SHA-I) , Digital signatures and authentication protocols : Digital signatures , Authentication protocols , Digital signature standard.

UNIT 4
Networks security practice : Authentication applications – Kerberos, X.509 directory authentication service
E-mail security : Pretty good privacy , S/MIME

UNIT 5
IP security : Overview , Architecture , Authentication header , Encapsulating security payload , Combining security associations , Key management. Web security : Web security considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction, SHTTP.

UNIT 6
Security systems : Intruders , Intrusion detection, viruses and related threats , Firewalls design principles , Trusted systems, Virtual private networks.

Text Books:
- Cryptography & Networks Security Principles & Practice(Pearson Education) - William Stallings.
- Networks Security Essentials Applications & Standards(Pearson Education) - William Stallings.
- Cryptography and Network Security by Atul Kahate, Tata Mc. Graw Hill
- Reference Books:
- Introduction to Computer Security by Matt Bishop Pearson education
- Security in computing by Pfleeger & Pfleeger Pearson education

88CS3: Elective-III:- Natural Language Processing

Unit- 1
Introduction and requirement of NLP, Words and their distribution, PERL Tutorial, Corpus Processing.

Unit – 2
Language modeling and Smoothing, Part of speech tagging, Word sense disambiguation. Basic Search algorithms, Blind Graph Search algorithm, Search Space with FSM and CFG, Search space for Bi-grams and Uni-grams, Viterbi Beam Search.

Unit – 3
Classification and retrieval of information, Syntax parsing.

Unit – 4
Clustering Techniques, Machine Translation and Sentence alignment, Document Structure detection, Text normalization: Domain specific tags, Number formats.

Unit – 5
Methodologies of discourse analysis, Context Sensitive Speech conversion, Text Summarization techniques.

Unit – 6
Dialog and Question-Answering, Information Retrieval Vector Space Model - Latent semantic indexing, etc.Information Extraction

Text Books:
- "Foundations of Statistical Natural Language Processing" by Manning & Schütze
- Natural Language understanding by James Allen, Pearson Education.
- "Speech and Language Processing" by Jurafsky & Martin

88CS3: Elective-III: Mobile Computing

UNIT-I:
Introduction to wireless communication, wireless transmission, frequencies for radio transmission, signal prorogation, multiplexing, modulation, spread spectrum, introduction to cellular system.

UNIT-II:
Medium access control : Motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA, GSM : System architecture, protocols, localization and calling, handover.

UNIT-III:
Satellite systems , Wireless LAN : IEEE 802.11

UNIT-IV:
Wireless LAN : HIPERLAN, Bluetooth

UNIT-V:
Mobile Network Layer : Mobile IP, dynamic host, configuration protocol, adhoc networks,. Mobile transport layer : Traditional TCP, Indirect TCP , Snoopy TCP,mobile TCP, Transaction oriented TCP.

UNIT-VI:
Security Issues in Mobile Computing

TEXT BOOKS:

- Mobile Communication 2nd edition by Jochen Schiller, Pearson education
- Mobile Computing by Asoke Talukder, Roopa Yavagal (Tata McGraw Hill)

88CS3: Elective-III:- Soft Computing

UNIT-I:-
Learning and Soft Computing: Examples of Applications in Diverse Fields, Basic Tools of Soft Computing, Basic Mathematics of Soft Computing, Learning and Statistical Approaches to Regression and Classification.

UNIT-II:-
Single-Layer networks: The Perceptron, Adaline and the Least Mean Square Algorithm. Multilayer Perceptrons: The Error Backpropogation Algorithm, The Generalized Delta Rule, Heuristics or Practical Aspects of the Error Backpropogation Algorithm

UNIT-III:-
Radial Basis Function Networks: Ill Posed Problems and the Regularization Technique, Stabilizers and Basis Functions, Generalized Radial Basis Function Networks, Moving Centers Learning, Regularization with Nonradial Basis Functions, Orthogonal Least Squares, Optimal Subset Selection by Linear Programming.

UNIT-IV:-
Fuzzy Logic Systems: Basics of Fuzzy Logic Theory, Crisp and Fuzzy Sets, Basic Set Operations, Fuzzy Relations, Composition of Fuzzy Relations, Fuzzy Inference, Zadeh's Compositional Rule of Inference, Defuzzification, Mathematical Similarities between Neural Networks and Fuzzy Logic Models, Fuzzy Additive Models.

UNIT-V:-
Evolutionary Algorithms: Difficulties with Classical Optimization Algorithms, Genetic Algorithms, Evolution Strategies, Evolutionary Programming, Genetic Programming, Multi-Modal Function Optimization, Crowding Model, Sharing Function Model.

UNIT-VI:-
Non-Elitist Multi-Objective Evolutionary Algorithms: Motivation for Finding Multiple Pareto-Optimal Solutions, Early Suggestions, Example Problems, Vector Evaluated Genetic Algorithm, Vector-Optimized Evolution Strategy, Weight-Based Genetic Algorithm, Random Weighted Genetic Algorithm, Multiple Objective Genetic Algorithm, non-Dominated Sorting Genetic Algorithm, Niched-Pareto Genetic Algorithm, Predator-Prey Evolution Strategy, Other Methods. Suggestions for Assignments: Implementation of algorithms in 'C/C++/MATLAB'.

Text Book:
- Learning and Soft Computing by Vojislav Kecman, Pearson education.
- Multi-Objective Optimization using Evolutionary Algorithms by Kalyanmoy Deb, WSE Willey

Reference Books:
- Artificial Neural Networks by Robert J. Schalkoff (McGraw Hill)

88CS3: Elective III:- Topics In Distributed Systems

UNIT-I
Motivation and goals, broad overview and advantages of distributed systems main characteristics : absence of global clock and state and possibility of large network delays. Issues in distributed systems such as transparency, scalability, security, resource management etc. theoretical foundation – Lamport's clocks Chandy-Lamport Global State recording algorithm – termination detection.

UNIT-II
Distributed mutual exclusion – Lamport, Ricart – Agrawal non-token based algorithm – token based algorithms – comparative performance analysis.

UNIT-III
Distributed deadlock detection issues – central and distributed detection algorithm – agreement protocols – model of processor failures – Byzantine agreement and other problems – solutions and applications.

UNIT-IV
Distributed file systems – design issues – case studies with emphasis on NFS-distributed shared memory – coherence and coherence protocols – design issues and case studies.

UNIT-V
Distributed scheduling – issues, load distributing algorithms – load sharing policies and case studies – task migration and issues.

UNIT-VI
Recovery: introduction and basic concepts – backward and forward error recovery, checkpointing : synchronous and asynchronous – atomic actions and commit protocols – voting protocols – reliable communication – cryptography : private and public – implementation issues, RSA algorithm- authentication in distributed systems – Kerberos case study.

BOOKS:

- Advanced concepts in Operating Systems – Singhal and Shivratri; McGraw Hill
- Distributed Systems – George Colouris, Pearson Education.

Reference books:

- Modern Operating Systems – Tanenbaum, Pearson Education
- Distributed systems: Principles and Paradigms, A. S. Tanenbaum, Paerson Education.

88CS4 : ELECTIVE –IV: Data Warehousing and Mining

UNIT – I

The Compelling Need for data warehousing: Escalating Need for strategic information, failures of Past decision-support systems, operational versus decision-support systems, data warehousing – the only viable solution, data warehouse defined

UNIT-II

Data warehouse – The building Blocks: Defining Features, data warehouses and data marts, overview of the components, metadata in the data warehouse Defining the business requirements: Dimensional analysis, information packages – a new concept, requirements gathering methods, requirements definition: scope and content

UNIT – III

Principles of dimensional modeling: Objectives, From Requirements to data design, the STAR schema, STAR Schema Keys, Advantages of the STAR Schema Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, aggregate fact tables, families of STARS

UNIT – IV

OLAP in the Data Warehouse:

Demand for Online analytical processing, need for multidimensional analysis, fast access and powerful calculations, limitations of other analysis methods, OLAP is the answer, OLAP definitions and rules

UNIT-V

OLAP characteristics, major features and functions, general features, dimensional analysis, what are hypercubes? Drill-down and roll-up, slice-and-dice or rotation, OLAP models, overview of variations, the MOLAP model, the ROLAP model, ROLAP versus MOLAP, OLAP implementation considerations, Introduction to OLTP.

UNIT – VI

Data Mining Basics: What is Data Mining, Data Mining Defined, The knowledge discovery process, OLAP versus data mining, data mining and the data warehouse, Major Data Mining Techniques, Cluster detection, decision trees, memory-based reasoning, link analysis, neural networks, genetic algorithms, moving into data mining, Data Mining Applications, Benefits of data mining, applications in retail industry, applications in telecommunications industry, applications in banking and finance.

TEXT BOOKS:
- Data Mining and Data Warehousing and OLAP –Alex Berson and Smith (McGraw Gill Pub)

REFERENCES BOOKS:

- W. H. Inmon, "Building the operational data store", 2nd Ed., John Wiley, 1999.
- Kamber and Han, "Data Mining Concepts and Techniques", Hartcourt India P. Ltd. 2001 3.Paul Raj Poonia, "Fundamentals of Dat Warehousing", John Wiley & Sons, 2004.
- Sam Anthony, "Data Warehousing in the real world: A practical guide for building decision support systems", John Wiley, 2004

88CS4: ELECTIVE-IV :- Grid Computing

UNIT – I

Overview. Focuses on grid computing as emerging new computing paradigm for solving complex collaborative problems that require massive resources and infinite CPU cycle. The topics included: Definition of Grid; Basic Building Blocks; Issues in Management of Grid Models; Evolution of Grid Models.

UNIT – II

Architecture. Deals with grid architecture providing an anatomical look into fundamental system components and their functionalities as well as interactions. Topics: Requirements concerning abstractions, behaviors, resources, connectivity and protocols; Open grid service architectures.

UNIT – III

Environment. Talks about grid computing environments. Topics : Overview of GCE; Programming models; Middleware for building grid computing environments; Language support (MPI-G, MPI-G2, etc) for grid computing; Meta models for grid programming; Security

UNIT – IV

Applications Delas with case studies, how the global computing infrastructure has become a reality for collaborative complex data intensive computing aid for federated database services, web services, bioinformatics. It will also include among others some selection of topics from Seti project, Sun grid engine Sky server and some national grid projects.

UNIT – V

Monitoring and evaluation It will include following: Monitoring; Scheduling; Performance tuning; Debugging and performance diagnostic issues;

UNIT – VI

Computational geometry, geometric preliminaries, models of computation

Text Books:
- Grid Computing: A research monograph: D. Janakiram, Tata McGrawhill Publication.
- The Grid: Blueprint for a New Computing Infrastructure (2nd edition) by Ian Foster (Editor), Carl Kesselman (Editor) Publisher: Morgan Kaufmann; 2nd edition (November 2003) ISBN: 1-558-60933-4.

- Grid Computing: Making the Global Infrastructure a Reality by Francine Berman (Editor), Geoffrey Fox (Editor), Tony Hey (Editor) Publisher: John Wiley & Sons; (April 8, 2003) ISBN: 0-470-85319-0.
- Grid Resource Management: State of the Art and Future Trends by Jarek Nabrzyski (Editor), Jennifer M. Schopf (Editor), Jon Weglarz (Editor) Publisher: Kluwer Academic Publishers; (September 2003) ISBN: 1-402-07575-8.

88CS4: Elective-IV:- Digital Image Processing

UNIT-I:-
Introduction: Introduction, Fundamental steps in Image Processing, Elements of DIP systems, Element of visual perception.
Fundamentals of Image Processing: A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels, Image Geometry in 2D.

UNIT-II:-
Image Enhancement in the Spatial Domain: Introduction to Spatial and Frequency Methods, Basic Gray Level Transformations, Histogram Equalization, Histogram Processing, Local Enhancement, Image Subtraction, Image Averaging, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.

UNIT-III:-
Transforms:- Introduction to Fourier Transformation, Discrete Fourier Transformation, Fast Fourier Transformation, Fourier Properties, 2D FT, Inverse Fourier Transform.

UNIT-IV:-
Image Enhancement in the Frequency Domain: Filtering in the Frequency Domain, Correspondence between Filtering in Spatial and Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering, Implementation. Introduction to Color Image Processing: RGB and HIS color Models.

UNIT-V:-
Image Segmentation: Point Detection, Line Detection, Edge Detection, Gradient Operator, Edge Linking and Boundary Detection, Thresholding, Region-oriented Segmentation.

UNIT-VI:-
Representation: Chain Codes, Polygonal Approximations, Signatures, Boundary Segments, Skeleton of a Region.
Description: Boundary Descriptors, Shape Numbers, Fourier Descriptors, Regional Descriptors, Simple Descriptors, Topological Descriptors.
Suggestions for Assignments: Implementation of Image Processing algorithms in 'C/C++/MATLAB'.

Text Book:
- Rafel C. Gonzalez and Richard E. Woods, "Digital Image Processing ", 2nd Edition, Pearson education

Reference Books:
- K. Jain," Fundamentals of Digital Image Processing", Pearson education.
- W. K. Pratt," Digital Image Processing",3rd Edition, John Wiley and Sons, New York.

88CS4: ELECTIVE-IV:- Embedded Systems

UNIT I:
AN INTRODUCTION TO EMBEDDED SYSTEMS
An Embedded system processor in the system. other hardware units, software embedded into a system. exemplary embedded systems, embedded system - on- chip (SOC) and in VLSI circuit. Processor and memory organization - Structural Units in a Processor. Processor selection for an embedded system, memory devices. memory selection for an embedded systems, allocation of memory to program cache and memory management links segments and blocks and memory map of a system, DMA. Interfacing processors, memories and Input Output Devices.

UNIT II:
DEVICES AND BUSES FOR DEVICE NETWORKS
1/0 devices timer and colmting devices. serial communication using the "12 C' CAN. profibus foundation field bus. and advanced I/O buses between the network multiple devices. host systems or computer parallel communication between the networked 1/0 multiple devices using the ISA. PCL PCI-X and advanced buses.

UNIT III:
DEVICE DRIVERS AND INTERRUPTS SERVICING MECHANISM Device drivers, parallel port and serial port device drivers in a system, device drivers for internal programmable timing devices, interrupt servicing mechanism.

UNIT IV:
PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++, VC++,AND JAVA
Interprocess communication and synchronization of processes, task and threads. multiple processes in an application. problem of sharing data by multiple tasks and routines, interprocess communication.

UNIT V:
HARDWARE - software co-design in an embedded system, embedded system project management. embedded system design and co-design issues in system development process, design cycle in the development phase for an embedded system, use of target systems, use of software tools for development of an embedded system, use of scopes and logic analysis for system. hardware tests. Issues in embedded system design.

TEXT BOOKS:

- Embedded systems: Architecture, programming and design by Rajkamal, TMH

REFERENCE Books:
- Embedded system design by Arnold S Burger. CMP
- An embedded software primer by David Simon. PEA

Embedded systems des