List of Electives

Sl. No	Subject Code	Subject Name
01	UIS001E	ADVANCED COMPUTER ARCHITECTURES
02	UIS002E	ADVANCED GRAPH THEORY
03	UIS003E	ARTIFICIAL INTELLIGENCE
04	UIS004E	CRYPTOGRAPHY AND NETWORK SECURITY
05	UIS005E	DIGITAL IMAGE PROCESSING
06	UIS006E	DISTRIBUTED OPERATING SYSTEMS
07	UIS007E	FUZZY LOGIC
08	UIS008E	GENETIC ALGORITHMS
09	UIS009E	NETWORK MANAGEMENT SYSTEMS
10	UIS010E	PATTERN RECOGNITION
11	UIS011E	REAL TIME OPERATING SYSTEMS
12	UIS012E	SOFTWARE ARCHITECTURE
13	UIS013E	WEB SERVICES AND SERVICE ORIENTED ARCHITECTURE
14	UIS014E	SYSTEM MODELING AND SIMULATION
15	UIS015E	JAVA AND J2EE
16	UIS016E	ADVANCED DBMS.
17	UIS017E	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS
18	UIS018E	CLIENT SERVER COMPUTING
19	UIS019E	DATA MINING
20	UIS020E	DISTRIBUTED DATA BASES
21	UIS021E	EMBEDDED SYSTEMS
22	UIS022E	LINUX KERNEL PROGRAMMING
23	UIS023E	NEURAL NETWORKS
24	UIS024E	PRINCIPLES OF PROGRAMMING LANGAUAGES
25	UIS025E	SOFT COMPUTING
26	UIS026E	WEB PROGRAMMING
27	UIS027E	MOBILE COMPUTING
28	UIS028E	COMPILER DESIGN
29	UIS029E	C# PROGRAMMING AND .NET
30	UIS030E	SOFTWARE TESTING
31	UIS031E	STORAGE TECHNOLOGY
32	UIS032E	OPERATING SYSTEMS- A DESIGN ORIENTED APPROACH
33	UIS033E	DISTRIBUTED CLOUD COMPUTING
34	UIS034E	COMPUTER GRAPHICS & VISUALIZATION
35	UIS035E	LINUX INTERNALS
36	UIS036E	ADVANCED JAVA PROGRAMMING
37	UIS037E	ADVANCED DATA STRUCTURES AND ALGORITHMS
38	UIS038E	BIG DATA AND ANALYTICS
39	UIIS039E	NO SQL

UIS001E: ADVANCED COMPUTER ARCHITECTURES
3 CREDITS (3-0-0)

UNIT - 1

FUNDAMENTALS OF COMPUTER DESIGN: Introduction; Classes of computers; Defining computer architecture; Trends in Technology, power in Integrated Circuits and cost; Dependability; Measuring, reporting and summarizing Performance; Quantitative Principles of computer design; **PIPELINING:** Introduction; Pipeline hazards.

10 hours

UNIT - 2

IMPLEMENTATION OF PIPELINE; Issues pipelining implementation.

INSTRUCTION –LEVEL PARALLELISM – 1: ILP: Concepts and challenges; Basic Compiler Techniques for exposing ILP; Reducing Branch costs with prediction; Overcoming Data hazards with Dynamic scheduling; Hardware-based speculation.

10 Hours

UNIT - 3

INSTRUCTION –LEVEL PARALLELISM – 2: Exploiting ILP using multiple issue and static scheduling; Exploiting ILP using dynamic scheduling, multiple issue and speculation; Advanced Techniques for instruction delivery and Speculation; The Intel Pentium 4 as example.

MULTIPROCESSORS AND THREAD –LEVEL PARALLELISM:
Introduction; Symmetric shared-memory architectures; Performance of symmetric shared–memory multiprocessors;

10 Hours

UNIT - 4

DISTRIBUTED SHARED MEMORY AND DIRECTORY-BASED COHERENCE; Basics of synchronization; Models of Memory Consistency.

REVIEW OF MEMORY HIERARCHY: Introduction; Cache performance; Cache Optimizations, Virtual memory.

10 Hours

TEXT BOOK:

1. **Computer Architecture, A Quantitative Approach** – John L. Hennessey and David A. Patterson:, 4th Edition, Elsevier, 2007.

REFERENCE BOOKS:

1. **Advanced Computer Architecture Parallelism, Scalability** – Kai Hwang:, Programability**,** Tata Mc Grawhill, 2003.
2. **Parallel Computer Architecture, A Hardware / Software Approach** – David E. Culler, Jaswinder Pal Singh, Anoop Gupta: Morgan Kaufman, 1999.

UIS002E: ADVANCED GRAPH THEORY.
3 CREDITS (3-0-0)

UNIT – I **10 hrs.**

Introduction: What is a graph?, Applications of graphs, Finite and Infinite Graphs, Incidence and degree, Isolated and pendent vertices, null graphs.
Paths and Circuits: Isomorphism, Sub graphs, Walks, Paths, and Circuits, Connected graphs, Disconnected graphs, and components. Euler graphs, Hamiltonian paths and circuits. Traveling salesman problem.
Trees and Fundamental Circuits: Trees, Properties of trees, Pendent vertices in trees, Distance and centers in trees, Rooted and binary trees, Spanning trees, Fundamental Circuits, All spanning trees, spanning trees in a weighted graph.

UNIT – II

10 hrs

Cuts and vertices: Cut-sets, Properties of cut-sets, all cut-sets in a graph, connectivity and seperability, network flows, I & II isomorphism.
Planar and dual graphs: Combinatorial v/s geometric graphs, planar graphs, representations of a planar graphs, detection of planarity, geometric dual, combinatorial dual, criteria of planarity.
Matrix representations of graphs: Incident matrix, submatrices of A(G), Circuit matrix, Fundamental circuit matrix and rank of B, Cut-set matrix, Relationships among A_f, B_f, and C_f. Path matrix, adjacency matrix

UNIT – III

10 hrs

Coloring, Covering and partitioning: Chromatic Number, Chromatic partitioning, Chromatic Polynomial, Matchings, Coverings, four color problem.
Directed Graphs: What is Directed graphs, types of directed graphs, digraphs and binary relations, Euler digraphs, trees with directed edges, Fundamental circuits in directed graphs, Matrices A, B and C of digraphs, Adjacency matrix of digraphs, paired comparison and tournament, acyclic digraphs and decylization.

UNIT – IV **12 hrs**

Graph theoretic algorithma and Computer programs: Algorithms, representation of a graphs, some basic algorithms, connectedness and components, a spanning tree, a set of fundamental circuits, cut-vertices and seperability, directed circuits, shortest paths algorithms, depth first search on a graph, isomorphism.
Graphs in computer programming.

Text Book:

1. Narsingh Deo, Graph Theory: With applications to Engineering and Computer Science, Eastern Economy Edition (Ch.1, 2, 3, 4, 5, 7, 8, 9, 11, 15.3)

Reference Books:

1. Ralph P. Grimaldi, B V. Ramana, 'Descrete and Combinatorial Mathematics', 5th edition, Pearson Education.

UIS003E: ARTIFICIAL INTELLIGENCE
3 CREDITS (3-0-0)

UNIT - 1

OVERVIEW OF ARTIFICIAL INTELLIGENCE:
Overview of AI; The importance of AI; Early work in AI; AI and the related fields Knowledge.

KNOWLEDGE: THE GENERAL CONCEPTS:
Introduction; Definition and importance of Knowledge; Knowledge-Based Systems; Representation of knowledge; Knowledge Organization; knowledge manipulation; Acquisition of Knowledge.

10 Hours

UNIT - 2

FORMALIZED SYMBOLIC LOGICS:
Introduction; Syntax and Semantics for propositional Logic;Syntax and Semantics for FOPL; Properties of Wffs; Conversion to Clausal form; Inference rules; The Resolution principle; Non deductive inference methods; Representation using rules.

DEALING WITH INCONSISTENCIES AND UNCERTAINITIES:
Introduction; Truth Maintenance systems;Default reasoning and the closed world assumption; Predicate completion and circumscription; Modal and temporal logics; Fuzzy logic and natural language computations

10 Hours

UNIT - 3

PROBABILISTIC REASONING
Introduction; Bayesian probabilistic inference; Possible world representations; Dempster-Shafter theory; Ad-Hoc methods;heuristic reasoning methods;

STRUCTURED KNOWLEDGE; GRAPHS,FRAMES, AND RELATED STRUCTURES
Introduction; Associative networks; Frame structures; Conceptual dependencies and scripts.

10 Hours

UNIT - 4

KNOWLEDGE ORGANIZATION AND MANIPULATIONS:
SEARCH and CONTROL STRATERGIES:
Introduction; preliminary concepts; Examples of Search problems; Uniformed or Blind search; Informed search; Searching And-Or graphs.

EXPERT SYSTEM ARCHITECTURES:
Introduction; Rule based system architectures; Non production system architectures; Dealing with uncertainity; Knowledge acquisition and validation; Knowledge system building tools.

10 Hours

TEXT BOOK:
1. **Introduction to Artificial Intelligence and Expert Systems**- Dan W. Patterson, PHI, 2003

REFERENCE BOOKS:
1. **Artificial Intelligence** - Elaine Rich, Kevin Knight, 2nd Edition, Tata McGraw Hill, 1991.
2. **Principles of Artificial Intelligence** – Nils J. Nilsson, Elsevier, 1980.
3. **Artificial Intelligence: A Modern Approach** – Stuart Russel, Peter Norvig, 2nd Edition, Pearson Education, 2003.

UIS004E: CRYPTOGRAPHY AND NETWORK SECURITY

UNIT I

INTRODUCTION TO NETWORK SECURITY: OSI security architecture, security attacks, security services, Security Mechanisms, a model of Network Security.

SYMMETRIC CIPHERS **10 Hrs**

Classical Encryption Techniques, Block Ciphers and the Data Encryption Standard, Introduction to Finite Fields, Confidentiality using Symmetric Encryption.

UNIT II

PUBLIC - KEY ENCRYPTION AND HASH FUNCTIONS **10 Hrs**

Introduction to Number Theory, Public-Key Cryptography and RSA, Key Management : Diffie-Hellman Key Exchange, Message Authentication and Hash Functions, secure Hash Algorithm, Digital Signatures and Authentication Protocols.

UNIT III

NETWORK SECURITY PRACTICE **10 Hrs**

Authentication Applications: Kerberos, X.509 Authentication Service, Electronic mail Security: Pretty Good Privacy, S/MIME, IP Security: Overview, Architecture, Authentication header, ESP, Key management.

UNIT IV

SYSTEM SECURITY **10 Hrs**

Malicious Software: Viruses and Related Threats, Viruses Countermeasures. Distributed Denial of Service Attacks, Firewalls: Firewall Design Principles, Trusted Systems.

Text Book:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, Fourth Edition, 2006.
   (Chapters: 1.2, 1.3, 1.4, 1.5, 1.6, 2, 3.1, 3.2, 3.3, 4, 7, 8, 9, 10.1, 10.2, 11, 12.1, 13, 14.1, 14.2, 15, 16.1,16.2, 16.3, 16.4, 16.6, 19, 20)

REFERENCES

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.
2. Behrouz A. Forouzan, Introduction to Cryptography and Network Security, 2008, McGraw-Hill
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007.

UIS005E: DIGITAL IMAGE PROCESSING
3 CREDITS (3-0-0)

UNIT-I

Fundamentals

What is digital Image Processing? , Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Basic relationships between pixels

Image Enhancement in Digital Spatial Domain

Background, Some basic gray level transformations, Histogram Processing, Enhancement using Arithmetic/Logic Operations, Basics of spatial filtering, Smoothing spatial filters, sharpening spatial filters

Image Enhancement in the Frequency Domain

Background, Introduction to the Fourier transform and the frequency domain, Smoothing frequency domain filters, Sharpening frequency domain filters, Homomorphic filtering, Implementation

14Hrs

UNIT-II

Image Restoration

A model of the image degradation/restoration process, Noise models, Restoration in the presence of noise only-spatial filtering, Periodic noise reduction by frequency domain filtering, Linear, position-invariant degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error filtering, Constrained least squares filtering, Geometric mean filter, Geometric transformations

10 Hrs

UNIT-III

Image Compression

Fundamentals, Image compression models, Elements of information theory, Error-free compression, Lossy compression and image compression standards.

08Hrs

UNIT-IV

Image Segmentation

Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region-based segmentation, Use of motion in segmentation.

Object Recognition

Pattern and pattern classes, Recognition based on Decision-Theoretic Methods

08Hrs

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods: "**Digital Image Processing"**, 2nd Edition, Pearson Education, 2002.

REFERENCE BOOKS:

1. Anil K. Jain: "**Fundamentals of Digital Image Processing"**, Prentice-Hall of India Pvt. Ltd., 1997.

2. B. Chanda, Dutta Majumdeer: "**Digital Image Processing and Analysis"**, Prentice-Hall of India Pvt. Ltd., 2002.

UIS006E: DISTRIBUTED OPERATING SYSTEMS
3 CREDITS (3-0-0)

UNIT I

Fundamentals **4 hrs**

What is Distributed Computing Systems?, Distributed Computing System Models, What is Distributed Operating System?, Issues in Designing a Distributed Operating system, Introduction to Distributed Computing Environment(DCE).

Message Passing **6 hrs**

Desirable Issues of Good Message Passing, Issues in IPC by Message Passing Synchronization, Buffering, Multidatagram Messages, Encoding and Decoding of message Data, Process Addressing, Failure Handling, Group Communication, Case Study: 4.3 BSD UNIX IPC Mechanism.

UNIT II

Remote Procedure Calls **4 hrs**

The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter – Passing Semantics Call semantics, Communication Protocols for RPCs, Complicated RPCs, Clint-Server Binding, Exception Handling, Security, Case Studies: Sun RPC.

Distributed Shared Memory **6 hrs**

General Architecture of DSM Systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing.

UNIT III

Synchronization **10 hrs**

Clock Synchronization, Event Ordering, Mutual Exclusion, Dead Lock, Election Algorithms.

UNIT IV

Resource Management **5 hrs**

Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach.

Process Management **3 hrs**

Process Migration, Threads.

Distributed File Systems **2 hrs**

Desirable Features of a Good Distributed File System, File models, File – Accessing Models, File – Sharing Semantics, File – Caching Schemes.

TEXT BOOK:

1) Distributed Operating System: Concepts and Design, Pradeep .K. Sinha, 1997, PHI
[Chapters: 1: 1.1, 1.3, 1.5-1.7, Chapter 3: 3.2-3.11, Chapter 4: 4.2-4.15, 4.20, Chapter 5: 5.2-5.8, Chapter 6: 6.2-6.6, Chapter 7: 7.2-7.4, Chapter 8: 8.2-8.3, Chapter 9: 9.3-9.6]

REFERENCE BOOK:

Distributed Operating System, Andrew .S. Tanenbaum, Pearson Education, 2002.

UIS007E: FUZZY LOGIC
3 CREDITS (3-0-0)

UNIT – 1

CRISP SETS AND FUZZY SETS:
Introduction; crisp sets: An overview; The notion of Fuzzy Sets; Basic concepts of Fuzzy Sets; Classical logic : An overview; Fuzzy logic.

OPERATIONS ON FUZZY SETS:
General discussion; Fuzzy Complement Fuzzy Union; Fuzzy intersection; Combination of operations; General aggregation operations.

CLASSICAL RELATIONS AND FUZZY RELATIONS: Cartesian Product, Crisp Relations - Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition. Fuzzy Relations - Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition, Non interactive Fuzzy sets. Tolerance and Equivalence Relations – Crisp Equivalence relation, Crisp Tolerance Relation, Fuzzy Tolerance and Equivalence relations. Value Assignments - Cosine Amplitude, Max-min Method, other Similarity methods.

10 Hours

UNIT - 2

MEMBERSHIP FUNCTIONS: Features of the Membership Function, Standard Forms and Boundaries, Fuzzification, Membership Value Assignments – Intuition, Inference, Rank Ordering, Angular Fuzzy Sets, Neural Networks, Genetic Algorithms, Inductive Reasoning.

FUZZY-TO-CRISP CONVERSIONS, FUZZY ARITHMETIC:
Lambda-Cuts for Fuzzy Sets, Lambda-Cuts for Fuzzy Relations, Defuzzification Methods. Extension Principle - Crisp Functions, Mapping and Relations.

10Hours

UNIT – 3

FUNCTIONS OF FUZZY SETS – Extension Principle, Fuzzy Transform (Mapping), Practical Considerations. Fuzzy Numbers Interval Analysis in Arithmetic, Approximate Methods of Extension - Vertex method, DSW Algorithm, Restricted DSW Algorithm, Comparisons. Fuzzy Vectors.

CLASSICAL LOGIC AND FUZZY LOGIC: Classical Predicate Logic – Tautologies, Contradictions, Equivalence, Exclusive Or and Exclusive Nor, Logical Proofs, Deductive Inferences. Fuzzy Logic, Approximate Reasoning, Fuzzy Tautologies, Contradictions, Equivalence and Logical Proofs, Other forms of the Implication Operation, Other forms of the Composition Operation.

10Hours

UNIT – 4

FUZZY RULE- BASED SYSTEMS: Natural Language, Linguistic Hedges, Rule-Based Systems - Canonical Rule Forms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules.

FUZZY DECISION MAKING: Fuzzy Synthetic Evaluation, Fuzzy Ordering, Preference and consensus, Multiobjective Decision Making, FuzzyBayesian Decision Method, Decision Making under Fuzzy States and Fuzzy actions.

10 Hours

TEXT BOOK:

1. **Fuzzy Logic with Engineering Applications –** Timothy J. Ross, McGraw-Hill, 1997.
2. **Fuzzy Sets Uncertainity and Information –** George J. Klir and Tina A. Folger ,Prentice Hall of India,2006

REFERENCE BOOK:

1. **Neural Networks and Fuzzy systems: A Dynamical System Approach** – B Kosko, Prentice Hall, 1991.

UIS008E: GENETIC ALGORITHMS
3 CREDITS (3-0-0)

UNIT I

INTRODUCTION TO GENETIC ALGORITHMS 10 Hrs

A Gentle Introduction to genetic algorithms

What Are Genetic Algorithms?, Robustness of Traditional Optimization and Search Methods, The Goals of Optimization, How Are Genetic Algorithms Different from Traditional Methods?, A Simple Genetic Algorithm, Genetic Algorithms at Work-a Simulation by hand, Grist for the Search Mill-Important Similarities, Similarity Templates (Schemata), learning the Lingo.

Genetic Algorithms Revisited: Mathematical Foundations

Who Shall Live and Who Shall Die? The Fundamental Theorem, Schema Processing at Work: An Example by Hand Revisited, The Two-armed and k-armed Bandit Problem, How Many Schemata Are Processed Usefully, The Building Block Hypothesis, Another Perspective: The Minimal Deceptive Problem

UNIT II

GA OPERATORS 11 Hrs

Computer Implementation of a Genetic Algorithm

Data Structures, Reproduction, Roulette-wheel Selection, Boltzman Selection, Tournament Selection-Rank Selection, Steady state selection, Crossover, and Mutation , A Time to Reproduce, a Time to Cross , Get with the Main Program, How Well Does it Work?, Mapping Objective Functions to Fitness Form, Fitness Scaling, Codings, A Multiparameter, Mapped, Fixed-Point Coding, Discretization ,Constraints.

UNIT III

APPPLICATIONS OF GA 11 Hrs

Some Applications of Genetic Algorithms

The Rise of Genetic Algorithms, Genetic Algorithm Applications of Historical Interest, De Jong and Function Optimization, Improvements in Basic Technique, Current Applications of Genetic Algorithms.

Advanced Operators and Techniques in Genetic Search

Dominance, Diploidy, and Abeyance, Inversion and Other Reordering Operators, Other Micro-operators, Niche and Speciation, Multiobjective Optimization, Knowledge-Based Techniques.

UNIT IV

INTRODUCTION TO GENETICS-BASED MACHINE LEARNING 10 Hrs

Introduction to Genetics Based Machine learning

Genetics-Based Machine Learning: Whence It Came, What is a Classifier System? , Rule and Message System, Apportionment of Credit: The Bucket Brigade, Genetic Algorithm, A Simple Classifier System in Pascal, Results Using the Simple Classifier System.

TEXT BOOKS

1. David E. Gold Berg, "Genetic Algorithms in Search, Optimization & Machine Learning", Pearson Education, 2001.
2. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI , 2003 (Chapters 8 and 9).

REFERENCE BOOK

1. Kalyanmoy Deb, "Optimization for Engineering Design, algorithms and examples", PHI, 1995.

UIS009E: NETWORK MANAGEMENT SYSTEMS
3 CREDITS (3-0-0)

UNIT – 1

INTRODUCTION, N/W MANAGEMENT STANDARDS, MODELS:

Introduction: Analogy of Telephone Network Management, Data and Telecommunication Network Distributed computing Environments, TCP/IPBased Networks: The Internet and Intranets, Communications Protocols and Standards- Communication Architectures, Protocol Layers and Services; Case Histories of Networking and Management – The Importance of topology, Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers

Network Management: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management. Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees.

10 Hours

UNIT – 2

N/W MANAGEMENT LANGUAGE, SNMPV1 NETWORK MANAGEMENT – 1

Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824

Encoding Structure; Macros, Functional Model. Snmpv1 network management – 1**:** Managed Network: The History of SNMP Management, Internet Organizations and standards, Internet Documents, The SNMP Model, The Organization Model, System Overview.

10 Hours

UNIT - 3

SNMPV1 NETWORK MANAGEMENT – 2 SNMP MANAGEMENT – RMON: The Information Model – Introduction, The Structure of Management Information, Managed Objects, Management Information Base.The SNMP Communication Model – The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, SNMP MIB Group, Functional Mode

Snmp management – RMON**:** Remote Monitoring, RMON SMI and MIB, RMONI1-RMON1 Textual Conventions, RMON1 Groups and Functions, Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token Ring Extension Groups. RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications; ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON.

10 Hours

UNIT – 4

RMON2,BROADBAND N/W MANAGEMENT,N/W MANAGEMENT APPLICATIONS:

Broadband Network Management: ATM Network**:**Broadband Networks and Services, ATM Technology – Virtual Path-Virtual Circuit, TM Packet Size, Integrated Service, SONET, ATM LAN Emulation, Virtual LAN; ATM Network Management – The ATM Network Reference Model, The Integrated Local Management Interface, The ATM Management Information Base, The Role of SNMP and ILMI in ATM Management, M1 Interface: Management of ATM Network Element, M2 Interface: Management of Private Networks, M3 Interface: Customer Network Management of Public Networks, M4 Interface: Public Network Management, Management of LAN Emulation, ATM Digital Exchange Interface Management

Network Management Applications**:** Configuration Management- Fault Management, Performance Management, Event Correlation, Security Management, Accounting Management applications overview, Policy- Based Management, Service Level Management.

10 Hours

TEXT BOOK:

1. **Network Management- Principles and Practice –** Mani Subramanian, Pearson Education, 2003.

REFERENCE BOOK:

1. **Network Management Concepts and Practices A Hands-On Approach -** J. Richard Burke, PHI, 2008.

UIS010E: PATTERN RECOGNITION
3 CREDITS (3-0-0)

UNIT I **(10 hrs)**

Pattern Recognition Overview: Pattern recognition, classification and description, Patterns and feature extraction with example, Training and learning PR systems, Pattern Recognition Approaches.

Bayes Decision theory: Introduction, Bayesian Decision Theory - continuous features, minimum error rate classification, classifiers, discriminant functions, and decision surfaces. Error probabilities and integrals, normal density, discriminant functions for normal density, Bayes Decision theory - Discrete features.

UNIT II **(10 hrs)**

Supervised learning(parametric technique): Parameter estimation and supervised learning, Maximum likelihood estimation, The Bayesian Parameter estimation approach..

Nonparametric technique*:* Density estimation, Parzen windows, k_n - Nearest Neighbor estimation, estimation of posterior probabilities, nearest- neighbor rule.

UNIT III **(10 hrs)**

Linear discriminant functions*:* Linear discriminant functions and decision surfaces, generalized linear discriminant functions, 2-category linearly separable case, non-separable behavior, linear programming algorithms.

Multiplayer neural networks: Feed forward operation and classification, Back propagation algorithm, error surfaces, back propagation as feature mapping, practical techniques for improving back propagation.

UNIT IV **(10 hrs)**

Unsupervised learning and clustering*:* Mixture densities and identifiably, maximum likelihood estimates, application to normal mixtures, unsupervised Bayesian learning, data description and clustering, hierarchical clustering.

Text Books

1. R. O. Duda, P. E. Hart, and D. G. Stork, " *Pattern Classification"*, 2nd ed., John Wiley & Sons, New York, 2001 (Chapter 2,4,5,6,10)

2. Robert J. Schalkoff, "*Pattern Recognition: Statical, Structural and Neural Approaches*" John Wiley & Sons, New York, 2005 (Chapter 1,3,)

Reference Books

1. K. S. Fu, "*Syntactic Pattern Recognition and Applications"*, Prentice Hall, Eaglewood cliffs, N.J., 1982

2. C. M. Bishop, "*Neural Network for Pattern Recognition"*, Oxford University Press, New York, 1998

3. E. Gose, R. Johnsonbaugh, and S. Jost, "*Pattern Recognition and Image Analysis"*, Prentice Hall of India, New Delhi, 1999

College Name	:	**Basaveshwar Engineering College (Autonomous), Bagalkot**
Department Name	:	**Information Science and Engineering**
Semester	:	**V**
Subject	:	**REAL TIME OPERATING SYSTEMS**
Subject code	:	**UIS011E**
Credits	:	**03**
Teaching Hours		**40**

UNIT - I

Basic Real-Time Concepts:

Basic Computer Architecture-Bus Transfer Mechanism, Input and Output, Memory, CPU Operation; Some Terminology- Software Concepts, System Concepts, Real-Time Definitions, Events and Determinism, Synchronous and Asynchronous Events, Determinism, Time-Loading; Real-Time Design Issues;

Real- Time Specification And Design Techniques

Natural Languages; Mathematical Specification; Flowcharts; Structure Charts; Pseudocode and Programming Design Languages; Finite State Automata; Data Flow Diagrarns- DeMarco's Rules, Hatley and Pribhai's Extensions; Petri Nets; Warnier-Orr Notation- Indexed Loop; Statecharts- Depth, Orthogonality, Broadcast Communication; Sanity in Using Graphical Techniques.

10 Hrs

UNIT - II

Real- Time Kernels

Polled Loop System- Polled Loop with Interrupts; Phase/State- Driven Code; Coroutines; Interrupt-Driven Systems- Context Switching, Round-Robin Systems, Preemptive Priority Systems, Major and Minor Cycles, Hybrid Systems; Foreground/Background Systems- Background Processing, Initialization, Real-Time operation; Full-Featured Real Time Operating Systems- Task- Control Block Model; Build or Buy?

POSIT.

Intertask Communication and Synchronization

Buffering Data- Time-Relative Buffering, Ring Buffers; Mailboxes Mailbox Implementation, Other Operations on Mailboxes, Queues; Critical Regions; Semaphores- Mailboxes and Semaphores, Counting

Semaphores, Problems with Semaphores, The Test- and- Set Instruction; Event Flags and Signals; Deadlock- Avoidance, Detect and Recover.

10 Hrs

UNIT - III

Real – Time Memory Management

Process Stack Management- Task Control Block Model, Managing the Stack,Run Time Ring Buffer, Maximum Stack Size, Multiple Stack Size, Multiple Stack arrangements, Task Control Block Model. Dynamic Allocation- Swapping, Overlays, MFT, MVT,, Demand Paging, Working Sets, Real Time Garbage Collection, Contiguous File Systems.

System Performance Analysis And Optimization

Response-Time Calculation- Polled Loops, Coroutines / Phase- Driven Code, Interrupt Systems; Interrupt Latency- Propagation Delay, Macroinstruction Execution Times, Interrupts Disabled, Preemption, Low Priority Interrupts High; Time-Loading and Its Measurement Using a Logic Analyzer, Instruction Counting, Instruction Execution Time Simulators, Deterministic Performance; Reducing Response Times and Time Loading- Compute at Slowest Cycle, Scaled Arithmetic, Other Optimization Techniques, 10 Hrs

UNIT - IV

Reliability, Testing, And Fault Tolerance

"Faults, Failures, Bugs and Effects; Reliability- Formal Definition, Calculating System Reliability; Testing-Unit Level Testing, System Level Testing,,Fault Tolerance-General Problems Handling, N-version Programming, Built-In-Test Software,CPU Testing.

Hardware! Software Integration

Goals of Real-Time System Integration- System Unification, System Validation; Tools- Millimeters, Oscilloscope, Logic Analyzer, In-Circuit Emulator, Software Simulators, Hardware Prototypes/ Simulators, Debuggers; Methodology- Establishing a Baseline, Backoff Method, Patching; The Software Heisenberg Uncertainty Principle- Real-World Analogies, The Software Heisenberg

Uncertainty Principle, Testing of Software, Time- and Memory-Loading, Other Implications. 10 Hrs		
Text Books	:	**Real- Time Systems Design and Analysis- An Engineer's Handbook**,, Phillip A. Laplante, 2005,' ' PHI Publications, Second Edition.
Reference Books	:	**Real Time Systems**, Jane Liu, PHI publication.

UIS012E: SOFTWARE ARCHITECTURE
3 CREDITS (3-0-0)

UNIT – 1 **10 Hrs**

INTRODUCTION, ARCHITECTURE STYLES

The Architecture Business Cycle: Software processes and the architecture business cycle; Qualities of a "good" architecture; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.

Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation, Layered systems, Repositories, Interpreters, Process control; Other familiar architectures.

UNIT – 2

ARCHITECTURE STYLES: CASE STUDIES,QUALITY **10 Hrs**

Case Studies: Keyword in Context; Instrumentation software; Mobile robotics; Cruise control; Heterogeneous architectures;

Quality **:** Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. Achieving Quality: Introducing tactics;

UNIT – 3 **10 Hrs**

ARCHITECTURAL PATTERNS

Architectural patterns**:** Introduction, classification-1) From mud to structure: Basic concepts of Layers, 2) Distributed Systems: Basic concepts of Broker;

3) Interactive Systems: Basic concepts of MVC, 4**):** Adaptable Systems: Basic concepts of Microkernel, reflection

UNIT -4 **10 Hrs**

DESIGN PATTERNS, DESIGNING AND DOCUMENTATION

Some design patterns**:** Structural decomposition: Basic concepts of Whole – Part; Organization of work: Basic concepts of Master – Slave; Access Control: Basic concepts of Proxy.

Designing and documenting software**:** Architecture in the life cycle; Designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; Choosing the relevant views; Documenting a view; Documentation across views.

TEXT BOOKS:

1. Software Architecture in Practice - Len Bass, Paul Clements, Rick Kazman, 2nd Edition, Pearson Education, 2003.

2. Pattern-Oriented Software Architecture A System of Patterns, Volume 1 - Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, John Wiley and Sons, 2006

3. Software Architecture- Perspectives on an Emerging Discipline - Mary Shaw and David Garlan, Prentice-Hall of India, 2007

REFERENCE BOOK:

Design Patterns- Elements of Reusable Object-Oriented Software - E. Gamma, R. Helm, R. Johnson, J. Vlissides, Addison-Wesley, 1995

UIS013E: WEB SERVICES AND SERVICE ORIENTED ARCHITECTURE
3 CREDITS (3-0-0)

UNIT I
INTRODUCTION TO WEB SERVICES AND XML **10 Hrs.**

Introduction

The basics of Web Services: An Example; Next Generation of the Web; Interacting with Web Services; The Technology of Web Services; XML for business collaboration; ebXML; Web Services versus Other Technologies; Additional Technologies;

XML

An Example; Instance and Schema; Processing XML Documents; Namespaces; Transformation; XML Specifications and information.

UNIT II

WSDL AND SOAP **11 Hrs.**

WSDL

Basics; WSDL elements; The Extensible WSDL framework; Importing WSDL elements; WSDL-Related Namespaces; Extensions for binding to SOAP.

SOAP

Example; The SOAP Specifications; SOAP Message Processing; SOAP Use of Namespaces; Changes in the V1.2 draft; SOAP Multipart MIME Attachments; SOAP In the Context of Existing Systems; Future directions.

UNIT III

INTRODUCTION TO SOA & EVOLUTION OF SOA **11 Hrs.**

INTRODUCTION TO SOA, EVOLUTION OF SOA: Fundamental SOA; Common Characteristics of contemporary SOA; Common tangible benefits of SOA; An SOA timeline (from XML to Web services to SOA);
WEB SERVICES AND PRIMITIVE SOA: The Web services framework; Services (as Web services); Service descriptions (with WSDL); Messaging (with SOAP).

UNIT IV

WEB SERVICES AND CONTEMPORARY SOA **10 Hrs.**

WEB SERVICES AND CONTEMPORARY SOA – 1: Message exchange patterns; Service activity; Coordination; Atomic Transactions; Business Activities; Orchestration; Choreography.
WEB SERVICES AND CONTEMPORARY SOA – 2: Addressing;

Reliable messaging; Correlation; Policies

TEXT BOOKS

1. Eric Newcomer, ”Understanding Web Services XML, WSDL, SOAP, and UDDI”, Pearson Education, 2002.
2. James McGovern et al, ”Java Web Services Architecture”, Elsevier, 2003.
3. Thomas Erl, ” Service-Oriented Architecture Concepts, Technology, and Design “, Pearson Education, 2005.

REFERENCE BOOK

Eric Newcomer, Greg Lomow, “ Understanding SOA with Web Services”, Pearson education, 2005.

UIS014E: SYSTEM MODELING AND SIMULATION
3 CREDITS (3-0-0)

UNIT I **10 Hours**

Introduction When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; System modeling , principles used in modeling, Types of Models; Monte Carlo simulation method , Discrete-Event System Simulation; Steps in a Simulation Study. Simulation examples: Simulation of queuing systems;

UNIT II **10 Hours**

General Principles: Concepts in Discrete-Event Simulation: The Event-Scheduling/ Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling. **Random-Number Generation:** Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers.

UNIT III **10 Hours**

Random-Variate Generation: Inverse transforms technique-Exponential distribution, uniform distribution, discrete distributions, Acceptance-Rejection Technique-Poisson Distribution.**Verification and Validation of Simulation Models:** Model building, verification and validation; Verification of simulation models; Calibration and validation of models.

UNIT IV **10 Hours**

Input Modeling: Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data. **Output Analysis for a Single Model:** Types of simulations with respect to output analysis; Stochastic nature of output data. Measures of performance and their estimation; Output analysis for terminating simulations. **Simulation of computer system**: Introduction Simulation tools- Process orientation, Event Orientation, CPU simulation.

Text Books:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: Discrete-Event System Simulation, 4th Edition, Pearson Education, 2007.
2. Geoffrey Gordon “System Simulation”, PHI, Second Edition.

Reference Books:

1. Lawrence M. Leemis, Stephen K. Park: Discrete – Event Simulation: A First Course,Pearson / Prentice-Hall, 2006.
2. Averill M. Law: Simulation Modeling and Analysis,4th Edition, Tata McGraw-Hill,2007

UIS015E: JAVA AND J2EE
3 CREDITS (3-0-0)

UNIT 1 (9 hours)

INTRODUCTION TO JAVA: Java and Java applications; Java Development Kit(JDK); Java is interpreted, Byte, JVM; Object oriented programming; Simple Java programs. Data types and other tokens: Boolean variables, int, long, char, operators, arrays, white spaces, literals, assigning values; Creating and destroying objects; Access specifiers. Operators and Expressions: Arithmetic operators, Bitwise operators, Relational operators, The Assignment Operator, The ? Operator; Operator Precedence; Logical expression; Type casting; Strings. Control Statements: Selection statements, iteration statements, Jump statements.

CLASSES, INHERITANCE, EXCEPTIONS: Classes: classes in Java; Declaring a class; Class name; Super classes; Constructors; Creating instances of class; Inner classes.
Inheritance: Simple, multiple and multilevel inheritance; Overriding, overloading.
Exception handling: Exception handling in Java.

UNIT 2

(11 hours)

APPLETS, MULTI THREADED PROGRAMMING:
The Applet Class: Two types of Applets; Applet basics; Applet Architecture; An Applet skeleton; Simple Applet display methods; Requesting repainting; Using the Status Window; THE HTML APPLET tag; Passing parameters to Applets; getDocumentbase() and getCodebase(); ApletContext and showDocument(); The Audioclip Interface; The AppletStub Interface; Output to the Console.

Multi Threaded Programming : What are threads? How to make the classes threadable; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, read-write problem, producer-consumer problems.

UNIT 3 (10 hours)

EVENT HANDLING: Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes; Inner classes.

JAVA 2 ENTERPRISE EDITION OVERVIEW, DATABASE ACCESS:
Overview of J2EE and J2SE.
The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions.

UNIT 4 (10 hours)

SERVLETS: Background; The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A Simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking.

JSP, RMI: Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects.
Java Remote Method Invocation: Remote Method Invocation concept; Server side, Client side.

TEXT BOOKS:

1. **Java The Complete Reference –** Herbert Schildt, 7th Edition, Tata McGraw Hill, 2007.
2. **J2EE The Complete Reference –** Jim Keogh, Tata McGraw Hill, 2007.

Chapters refer to syllabus

REFERENCE BOOKS:

1. **Introduction to JAVA Programming-** Y. Deniel Liang, 6th Edition, Pearson Education, 2007.

The J2EE Tutorial- Stephanie Bodoff et al, 2nd Edition, Pearson Education, 2004.

UIS016E: ADVANCED DBMS.
3 CREDITS (3-0-0)

UNIT – I **10 hrs**.

Overview of normalization techniques.
Disk Storage, Basic File Structures, and Hashing: Introduction, Secondary storage structures, Buffering of blocks, Placing file records on disk, Operations on files, Files of unordered records (heap files), Files of ordered records (sorted files), Hashing Techniques.
Indexing structures for files: Types of single level ordered indexes, Multiple indexes, Dynamic Multilevel indexes using B-tress and B^+-trees, Indexes on multiple keys, Other types of indexes.

UNIT – II **10 Hrs**
Algorithms for query processing and optimization: Translating SQL queries into relational algebra, Algorithms for external sorting, Algorithms for SELECT, JOIN, PROJECT and Set operations, Implementing aggregate operations and OUTER JOINS Combining operations using pipelines, Using heuristics in query optimization, Using selectivity and cost estimates in query optimization.
Physical Database design and Tuning: Physical database design in relational database, Database tuning in relational systems.

UNIT – III **10 Hrs**
Web Database Programming Using PHP: Structured, semistructured and semi structured data, A simple PHP example, Overview of basic features of PHP, Overview of PHP Database programming.
XML: XML hierarchical (tree) data model, XML documents, DTD and XML schema, XML querying.

UNIT – IV **10 Hrs**
Data Mining Concepts: Overview of data mining technology, Association rules, Classification, Clustering, Approaches to other data mining problems, Applications of data mining, commercial data mining tools.
Overview of Data Warehousing and OLAP: Introduction definition and terminology, characteristics of data warehousing, data modeling for data warehouses, Building a data warehouse, typical functionality of data warehouse, data warehouse versus views, problems and open issues in data warehouses.

Text Book:

1. Rameez Elmashri, Shamakant B Navathe, ‘Fundamentals of Database Systems’, Fith Edition, Pearson Education.

Reference Books:

1. C J. Date, ‘An Introduction to Database Systems’, Sixth Edition, Adidson-Wesley.
2. Raghu Ramakrishna, Gehrke, ‘Database Management Systems’, Mc. Graw-Hill, Fifth edition.
3. Peter Rob, Carlos Coronel, ‘Database Systems: Design, Implementation & Management, Fourth Edition, Thomson Publications.
4. Bipin C. desai, ‘Introduction to Database Systems’, Galgotia, New Delhi.

UIS017E: Artificial Intelligence and Expert System

3 Credits (3-0-0)

UNIT – I

Introduction and Problems and Search

Introduction

Concepts and definition of AI, AI Problems, The Underlying assumption, What is an AI technique?, AI characteristics, Artificial Intelligence versus Natural Intelligence, Applications of AI. **6 Hrs.**

Problems, Problem Spaces, and Search

Defining the Problem as State Space Search, Production Systems, Problem Characteristics, Production Systems Characteristics, Issues in the Design of Search Programs, Advantages and Disadvantages of DFS & BFS Techniques. **6 hrs**

UNIT - II

Heuristic Search Techniques and Knowledge Representation

Generate – and – Test, Hill Climbing, Best-First Search, Problem reduction – AND – OR Graphs, Means-Ends Analysis. **6 Hrs**

Knowledge Representation - Representations and Mappings, Approaches to Knowledge Representation **4 Hrs.**

UNIT - III

Knowledge Representation

Issues in Knowledge Representation. Predicate Logic, Representing Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates.

8 Hrs

Resolution – Conversion to Clause form, the basis of resolution, resolution in propositional logic. **2 Hrs.**

UNIT - I V

Expert Systems

Basic Concepts of Expert System, Structure of Expert Systems, The Human Element in Expert Systems, How Expert Systems Work, Example of an Expert System Consultation, Problem Areas Addressed by Expert Systems, Benefits of Expert Systems, Problems and Limitations of Expert Systems, Expert System Success Factors, Type of Expert Systems, Expert Systems and the Internet / Intranets / Web. **10 Hrs**

Text Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Second Edition, Tata McGraw Hill.
2. Decision Support Systems and Intelligent Systems, Efraim Turban and Jay E. Aronson, Sixth Edition 2002, Pearson Education Asia.

Reference Book:

1. Artificial Intelligence & Expert Systems, S- Dan W. Patterson, Prentice Hall of India.

UIS018E: CLIENT SERVER COMPUTING
3 CREDITS (3-0-0)

UNIT I **10 Hrs**

Introduction: to client/server computing, advantages of client/server computing. **Architecture:** Data access architecture, Execution architecture Vertical slice-two-tiered client/server, stored procedure, three-tiered architecture. **Role of the client**, client services, Remote procedure call, print. Services, Remote services, Utility services, Message services, Network services, Application services, Database services,

UNIT II **10 Hrs**

Server functionality, Request processing, File services, Database services, Communication services, Security services, Network operating system, platforms, Server operating system. **Connectivity** - Open systems interconnect, communications interface technology, interprocess communication.

UNIT III **10Hrs**

Application development management issues-- platform and productivity, environment definition, productivity measures, performance, support, organization and management, task allocation server and client side.

UNIT IV **10 Hrs**

Distributed objects and components - CORBA, compound documents, Opendoc component model.

TEXT BOOKS:

1. Client/Server computing' by Patrick Smith and Steve Guengerich, II Edition, Prentice Hall.
2. The Essential client/server survival Guide' by Robert Orfali, Dan Harkey, Jeri Edwards, II edition, Galgotia Publications.

REFERENCE BOOKS:

1. Client/Server System Design and implementation by Larry T Vaughn, McGraw-Hill international Edition.
2. The CORBA Reference Guide by Alan Pope, Addison Wellesley

UIS019E: DATA MINING
(3-0-0)

UNIT – I **10 Hrs**

Introduction to data mining: Definition of Data Mining, Motivating Challenges of DM, Data Mining Tasks.

Data: Data Attributes, Types of Data, Quality of Data and Data Preprocessing, Measures of Similarity and Dissimilarity.

UNIT – II **10 Hrs**

Association Analysis: Definition of Association Analysis, Frequent Item Set Generation, Rule Generation, Compact Representation of Frequent Item Sets. Alternate Method of Generating Item Sets, FP Growth Algorithms, Evaluation of Association Patterns

UNIT – III **10 Hrs**

Classification: Preliminaries, General Approach To Solving Classification Problem, Decision Tree Based Classifier, Rule Based Classifier, Nearest Neighbor Classifier.

Cluster Analysis: Overview, K-means, DBSCAN

UNIT – IV **10 Hrs**

Applications: Data Mining Applications, Web Mining, Search Engines

Text Books:

1. "Introduction to Data Mining", Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education. (Chapter 1, 2, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 6.2, 6.3, 6.4, 6.5, 6.7, 6.8, 8.1, 8.2, 8.4)
2. "Data Mining – Concepts and Techniques", Jiawei Han and Micheline Kamber, Morgan Kaufman, 2006, 2nd Edition. (Chapter 10)
3. "Introduction to Data Mining with Case Studies", G K Gupta, PHI. (Chapter 5, 6)

UIS020E: DISTRIBUTED DATA BASES
3 CREDITS (3-0-0)

UNIT – I **10 Hrs**

Distributed Databases an Overview.
Levels of distribution transparency: Reference architecture, Types of data fragmentation, distribution transparency for read only queries, distribution transparency update applications, Distributed Database access primitives, Integrity constraints in distributed Databases.
Distributed Database Design: A frame work for Distributed Database design, Design of database fragmentation, allocation of fragments.

UNIT – II **10 Hrs**

Translation of global queries into fragment queries: Equivalence transformation for queries, Transforming global queries into fragment queries, Distributed grouping and aggregate function evaluation, Parametric queries.
Optimization of Access strategies: A frame work for query optimization, Join queries, General queries.

UNIT – III **10 Hrs**

Management of Distributed Transactions: A frame work for transaction management, supporting atomicity of distributed transactions, Concurrency control for distributed transactions, Architectural aspects of distributed transactions.
Concurrency control: Foundations of distributed concurrency control, distributed deadlocks, concurrency control based on time stamps.

UNIT – IV **10 Hrs**

Reliability: Basic concepts, Nonblocking commitment protocols, reliability and concurrency control,
Distributed database administration: Catalog management, Authorization and protection.
The R* project: Case study.

Text Books:

1. Stefeno Cery, Giuseppe Pelagatti, 'Distributed Databases: Principles and Systems', Mc. Graw-Hill International Editions. (ch. 1, 3, 4, 5, 6, 7, 8, 9, 10, 13)

Reference Books:

1. Rameez Elmashri, Shamakant B Navathe, 'Fundamentals of Database Systems', Fith Edition, Pearson Education.
2. C.J Date, 'An Introduction to Database Systems', Sixth Edition, Adidson-Wesley.
3. Raghu Ramakrishna, Gehrke, 'Database Management Systems', Mc. Graw-Hill, Fifth edition.

UIS021E: EMBEDDED SYSTEMS

3 CREDITS (3-0-0)

UNIT – 1

INTRODUCTION: Overview of embedded systems, embedded system design challenges, common design metrics and optimizing design metrics. Survey of different embedded system design technologies, trade-offs. Custom Single- Purpose Processors, Design of custom single purpose processors.

SINGLE-PURPOSE PROCESSORS: Hardware, Combinational Logic, Sequential Logic, RT level Combinational and Sequential Components, Optimizing single-purpose processors. Single-Purpose Processors: Software, Basic Architecture, Operation, Programmer's View, Development Environment, ASIPS.

08 Hours

UNIT – II

Standard Single-Purpose Peripherals, Timers, Counters, UART, PWM, LCD Controllers, Keypad controllers, Stepper Motor Controller, A to D Converters.

MEMORY: Introduction, Common memory Types, Compulsory memory, Memory Hierarchy and Cache, Advanced RAM.

08 Hours

UNIT – III

Interfacing, Communication Basics, Microprocessor Interfacing, Arbitration, Advanced Communication Principles, Protocols - Serial, Parallel and Wireless. INTERRUPTS: Basics - Shared Data Problem - Interrupt latency.

08 Hours

UNIT – IV

Survey of Software Architecture, Round Robin, Round Robin with Interrupts – Function Queues - scheduling - RTOS architecture.

INTRODUCTION TO RTOS: Tasks - states - Data - Semaphores and shared data. More operating systems services - Massage Queues - Mail Boxes -Timers – Events - Memory Management, Interrupt routines in RTOS environment.

16 Hours

TEXT BOOKS:

1. **Embedded System Design: A Unified Hardware/Software Introduction** - Frank Vahid, Tony Givargis, John Wiley & Sons, Inc.2002
2. **An Embedded software Primer** - David E. Simon: Pearson Education, 1999

REFERENCE BOOKS:

1. **Embedded Systems: Architecture and Programming,** Raj Kamal, TMH. 2008
2. **Embedded Systems Architecture – A Comprehensive Guide for Engineers and Programmers**, Tammy Noergaard, Elsevier Publication, 2005
3. **Embedded C programming**, Barnett, Cox & O'cull, Thomson (2005).

UIS022E: LINUX KERNEL PROGRAMMING

3 CREDITS (3-0-0)

UNIT I

1. INTRODUCTION TO THE KERNEL **3 hrs**

Important data structures, main algorithms, Implementation of system calls,

2. MEMORY MANAGEMENT **7 hrs**

The architecture independent memory model, The virtual address space of a process, Blocking device caching, Paging under Linux.

UNIT II

3.. INTERPROCESS COMMUNICATION **4 hrs**

Synchronization in the kernel, Communication via files, pipes, debugging using ptrace, System V IPC, IPC with sockets

4. THE LINUX FILE SYSTEM **6 hrs**

Basics principles, The representation of file systems in the kernel, The EX2 file system, The proc file system

UNIT III

5. DEVICE DRIVERS UNDER LINUX **5 hrs**

Character and block devices, Hardware, Polling, interrupts, and waiting queues, Implementing a driver, Dynamic and static drivers

6. NETWORK IMPLEMENTATION **5 hrs**

Introduction and overview, Important data structures, Network devices under Linux

UNIT IV

7. MODULES AND DEBUGGING **5 hrs**

What are modules?, Implementation in the kernel, The meaning of object sections, for modules and kernels, Parameter transfer and examples for modules and kernels, What can be implemented as a module? The kernel daemon, Simple date swapping between modules, An example module, Debugging

8. MULTIPROCESSING **5 hrs**

The Intel multiprocessor specification, Problems with multiprocessor system, Changes to the kernel, Atomic operations, Spin locks

Text Books:

1. Michael Beck , Linux Kernel Programming, Pearson Education, Third Edition [Chapters:3,4,5,6,7,8,9,10]

Reference Books:

1. Daniel P. Bovet, Marco Cesati, Understanding the Linux kernel, O'Reilly Media, 2nd Edition, 2002.

UIS023E: NEURAL NETWORKS

3 CREDITS (3-0-0)

UNIT - 1

ARTIFICIAL NEURAL SYSTEM: Neural computation, classifiers, Approximation and Autonomous drivers,Simple memory, Restoration patterns,Optimizing networks. Memory-based learning, Hebbian learning, Competitive learning.

FUNDAMENTAL CONCEPTS AND MODELS OF ARTIFICIAL NEURAL SYSTEM:

Biological neuron and their artificial models: biological neuron, Mc-Culloch-Pitts Neuron model, Neuron modeling of artificial neural systems. Models of artificial neural networks; neural processing; learning and Adaptation; neural network learning rules, Overview of neural networks.

10 Hours

UNIT – 2

SINGLE-LAYER PERCEPTRON CLASSIFIERS:

Classification model, Features, and Decision regions; Discriminant functions;Linear machine and Minimum distance classification; Non parametric training concept; Training and classification using the discrete perceptron algorithm and example, classifier AI nature of the learning process, Statistical learning theory, Single Layer continuous perceptron networks for linearly saparable classifications; Multicategory Single Layer perceptron networks.

10 Hours

UNIT - 3

MULTILAYER FEEDFORWARD NETWORKS – : Linearly nonsaparable pattern classification; Delta learning rule for Multiperceptron layer; Generalized Delta learning rule; Feedforward recall and Error back propogation Training; Learning factors; Classifying and Expert layered networks; Functional link networks.

10 Hours

UNIT – 4

SINGLE-LAYER FEEDBACK NETWORKS :

Basic concepts of Dynamical systems; Mathematical Foundations of Discrete-time Hopfield networks; Mathematical Foundations of Gradient type Hopfield networks; Transient Response of Continuous-time networks; Relaxation modeling in Single Layer feedback networks; Example solutions of Optimization problems.

10 Hours

TEXT BOOK:

1. **An Introduction to ARTIFICIAL NEURAL SYSTEM –** Jacek M. Zurada, A Jaico Publishing House

REFERENCE BOOKS:

1) **Understanding Neural Networks and Fuzzy Logic –**Stamatios V. Kartalopoulos, IEEE press
2) **An Introduction to Game Theory –** Martin Osborne, Oxford University Press, Indian Edition, 2004.
3) **Game Theory: Analysis of Conflict** – Roger B. Myerson, Harvard University Press, 1997.
4) **Microeconomic Theory** – Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green, Oxford University Press, New York, 1995.
5) **Game Theory and Strategy** – Philip D. Straffin, Jr., TheMathematical Association of America, January 1993.

UIS024E: PRINCIPLES OF PROGRAMMING LANGAUAGES
3 CREDITS (3-0-0)

UNIT I

1. Introduction :

Toward higher level languages, Programming paradigms, Language implementation: Bridging the gap, Expression notations, and Abstract syntax trees. **2 hours**

2. Imperative Programming :

Statements: Structured Programming

The need for structured programming, syntax directed control flow, design considerations: syntax, handling special cases in loops, programming with invariants, proof for partial correctness, and control in C. **4 hours**

Types: Data Representation

The role of types, basic types, Arrays: Sequences of elements, Records: Named fields, Unions and variant records, Sets, Pointers: Efficiency and dynamic allocation, two string tables, types and error checking **4 hours**

UNIT II

Imperative Programming:

Procedure activation

Introduction to procedures, parameter passing methods, scope for names, nested Scopes in the source text, activation records, lexical scope: procedures as in C **5 hours**

3. Object Oriented Programming:

Program design with modules, Object oriented thinking, Inheritance, Object oriented Programming in C++, Derived classes and information hiding. **5 hours**

UNIT III

4. Functional Programming

Elements of functional programming

A little language of expressions, Types: values and operations, Approaches to Expression evaluation, Lexical scope, Type checking. **4 hours**

Functional programming in a typed language

Exploring a list, Function declaration by cases, Function as first – class values, ML: Implicit types, Data types, Exception handling in ML. **4 hours**

Functional programming with lists

Scheme, a dialect of lisp, The structure of lists, List manipulation. **4 hours**

Unit IV

5. Logic Programming

Computing with relations, Introduction to prolog, Data structures in prolog, Programming Techniques, Control in prolog. **8 hours**

TEXT BOOKS:

1. Ravi Sethi, Programming languages, 2008, 2nd Edition, Pearson Education.

REFERENCE BOOKS:

1.Terrence W.Pratt, Programming languages Design and implementation, 4th Edition, Pearson Education/PHI.

2.Allen Tucker, Robert Nonan, Programming languages, 2007 Second Edition., Tata McGraw-Hill.

UIS025E: Soft Computing
3 CREDITS (3-0-0)

UNIT I: (10 hrs)

Introduction: Hard computing,-Features of hard computing, Soft computing - Features of soft computing, Hybrid Computing. ***Optimization and Some Traditional Methods:*** Introduction to Optimization - A practical example, Classification of optimization problems, principle of optimization, Duality principle, Traditional methods of optimization – Exhaustive search method, Random walk method, Steepest descent method, Drawbacks of traditional optimization methods.

UNIT II: (10 hrs)

Introduction to Genetic Algorithms (GA): Working cycle of a Genetic Algorithm, Binary coded GA, GA - parameters setting, Constraints handling in GA, Advantages & Disadvantages of GA. ***Some Specialized Genetic Algorithms*****:** Real Coded GA, Micro GA, Visualized interactive GA, Scheduling GA.

UNIT III: (10 hrs)

Introduction to Fuzzy Sets**:** Crisp Sets, Fuzzy sets. ***Fuzzy Reasoning and clustering:*** Introduction, Fuzzy logic controller, Fuzzy clustering.

UNIT IV: (10 hrs)

Fundamentals of Neural Networks**:** Introduction, Static vs. Dynamic Neural Networks, Training of Neural Networks. ***Some Examples of Neural Networks*****:** Multi Layer Feed Forward Neural Network (MLFFNN), Radial Basis Function Network (RBFN), Self organizing map(SOM), Recurrent Neural Networks(RNNs).

Text Book

1) D.K. Pratihar, "Soft Computing", Narosa Publishing House, New Delhi, (Chapters 1, 2, 3, 4, 5, 6, 7, 8)

Reference Books

1) R. Rajasekaran and G. A. Vijayalakshmi Pai, "*Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications" ,* Prentice Hall of India, New Delhi, 2003
2) D. E. Goldberg, "*Genetic Algorithms in Search, Optimization, and Machine earning"*, Addison-Wesley, Reading, MA, 1989
3) T. Ross, "*Fuzzy Logic with Engineering Applications*", Tata McGraw Hill, New Delhi, 1995
4) B. Yegnanarayana, "*Artificial Neural Networks",* Prentice Hall of India, New Delhi,1999

UISO26E: WEB PROGRAMMING
3 CREDITS (3-0-0)

UNIT – 1

FUNDAMENTALS OF WEB, HTML, AND XHTML

Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The web programmer's toolbox.
XHTML: Origins and evolution of HTML and XHTML, Basic Syntax, Standard XHTML, document structure, Basic text markup.
XHTML- Images; Hypertext links, Lists, Tables, Forms, Frames, Differences between HTML and XHTML.

11 Hours

UNIT – 2

JAVASCRIPT

JAVASCRIPT: Overview, Object orientation and JavaScript, General Syntactic characteristics, Primitives, operations and expressions, Screen o/p and keyboard i/p, Control statements, Arrays, Functions, Constructor, Pattern Matching using regular expressions, Errors in Scripts, Examples..

10 Hours

UNIT – 3
JAVASCRIPT AND HTML DOCUMENTS, DYNAMIC DOCUMENTS WITH JAVASCRIPT
JAVASCRIPT AND HTML DOCUMENTS: The JavaScript execution environment, The Document Object Model, Element access in JavaScript, Events and Event Handling, Handling events from the Body elements, Button elements, Text Box and Password elements.
DYNAMIC DOCUMENTS WITH JAVASCRIPT: Introduction to dynamic documents, Positioning and moving elements, element visibility, changing colors and fonts, Dynamic Content, Stacking elements, Locating the mouse cursor, reacting to a mouse click, slow movement of elements, Dragging and dropping elements.

10 Hours

UNIT – 4

SSI, PHP, PERL-CGI PROGRAMMING

SSI: Introduction – How it works, Tutorial
PHP: Introduction, Embedding PHP into HTML, Language Syntax – Variables, data types, Web variables, operators, Flow-control constructs.
PERL-CGI Programming: Origin and uses of Perl, Scalars and their operations, Assignment statements, simple i/p and o/p, Control statements, Fundamentals of Arrays, Hashes, References.
The CGI: CGI Linkage, Query String Format, CGI.pm module.

11 Hours

TEXT BOOKS

1) **Programming the World Wide Web** – Robert W.Sebesta, 4th Edition, Pearson Education, 2008.
2) **Open Source Web Development with LAMP** – James Lee and Brent Ware, Addison Wesley/Pearson Education Inc.2003.

REFERENCE BOOKS

1) **Web Programming Building Internet Applications** – Chris Bates, 3rd Edition, Wiley India, 2006.
2) **Internet and World Wide Web How to Program** – M.Deitel, P.J.Deitel, C.B.Goldberg, 3rd Edition, Pearson Education/PHI, 2004.
3) **The Web Warrior Guide to Web Programming** – Xue Bai et al, Thomson, 2003.

UIS027E: MOBILE COMPUTING
3CREDITS (3-0-0)

UNIT I

Introduction: Applications; A short history of wireless communication. **Wireless Transmission:** Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. **Medium Access Control**: Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SOMA, FOMA, TOMA: Fixed TOM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, PRMA packet reservation multiple access, reservation TOMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.

10 Hours

UNIT II

GSM and Similar Architectures: GSM – Services and System Architectures, Radio Interfaces, General Packet Radio Services. **Wireless Medium Access Control and CDMA – Based Communication** Medium Access Control, Introduction to CDMA – Based Systems, OFDM. **Mobile IP Network Layer:** IP and Mobile IP Network Layers Packet Delivery and Handover Management, Registration, Route Optimization, Dynamic Host Configuration Protocol. **Mobile Transport Layer:** Indirect TCP, Snooping TCP, Mobile TCP.

10 Hours.

UNIT III

Databases: Database Hoarding Techniques, Data Caching, Client – Server Computing and Adaptation, Transactional Models, Query Processing, **Data Dissemination and Broadcasting Systems:** Communication Asymmetry, Classification of Data – Delivery Mechanisms, Data Dissemination Broadcast Models, Digital Audio Broadcasting and Digital Video Broadcasting. **Data Synchronization in Mobile Computing Systems:** Synchronization, Synchronization Protocols, SyncML – Synchronization Language for Mobile Computing.

10 Hours

UNIT IV

Mobile Devices, Server and Management: Mobile agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security. **Wireless LAN, Mobile Internet Connectivity and Personal Area Network:** Wireless LAN (WiFi) Architecture and Protocol Layers, WAP 1.1 and WAP 2.0 Architectures, Bluetooth – enabled Devices Network, Zigbee. **Mobile Operating Systems:** Operating System, PalmOS, Windows CE, Symbian OS, Linux for Mobile Devices.

10 Hours

TEXT BOOK:

1) Raj Kamal, "**Mobile Computing**", Oxford University Press, 2007.

Reference Books:

1) Asoke Talkukder, Roopa R. Yavagal, "**Mobile Computing – Technology, Applications and Service Creation**", Tata McGraw Hill, 2007.
2) Schiller, "**Mobile Communication**", Pearson Publication, 2004.

UIS028E: COMPILER DESIGN
3 CREDITS (3-0-0)

UNIT -I

INTRODUCTION, LEXICAL ANALYSIS: Language processors; The structure of a Compilers; The evolution of programming languages; The science of building a compiler; Applications of Compiler technology; Programming language basics.
Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens.

10 Hours

UNIT –II

SYNTAX ANALYSIS: Introduction; Context-free Grammars; Writing a Grammar; Top-down Parsing, Bottom-up Parsing; Introduction to LR Parsing: Simple LR.

10 Hours

UNIT –III

SYNTAX-DIRECTED TRANSLATION: Syntax-Directed definitions; Evaluation order for SDDs; Applications of Syntax-directed translation.
INTERMEDIATE CODE GENERATION: Variants of syntax trees; Three address code; **Types and declarations** – Type Expressions, Type equivalence, Declarations, **Type checking** – Rules for Type Checking, Type conversions; Control flow; Back patching. **10 Hours**

UNIT –IV

RUN-TIME ENVIRONMENTS: Storage Organization; Stack allocation of space; Access to non-local data on the stack; Heap management.
CODE GENERATION: Issues in the design of Code Generator; The Target language; Addresses in the target code; Basic blocks and Flow graphs; Optimization of basic blocks. **10 Hours**

TEXT BOOK:

1. **Compilers- Principles, Techniques and Tools -** Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman, 2nd Edition, Addison- Wesley, 2007. (1.1 – 1.6; 3.1 – 3.4, 3.8; 4.1 – 4.6; 5.1 – 5.3; 6.1 – 6.3(6.3.1 - 6.3.3); 6.5 (6.5.1- 6.5.2) – 6.7; 7.1 – 7.4; 8.1 – 8.5.

REFERENCE BOOKS:

1. **Crafting a Compiler with C -** Charles N. Fischer, Richard J. leBlanc,Jr, Pearson Education, 1991.
2. **Modern Compiler Implementation in C -** Andrew W Apple, Cambridge University Press, 1997.
3. **Compiler Construction Principles & Practice** - Kenneth C Louden, Thomson Education, 1997.

UIS029E: C# PROGRAMMING AND .NET

3 CREDITS (3-0-0)

UNIT I

THE PHILOSOPHY OF .NET: Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR,CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries (aka Assemblies), Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime, **BUILDING C# APPLICATIONS:** The Role of the Command Line Complier (csc.exe), Building C # Application using csc.exe Working with csc.exe Response Files, Generating Bug Reports , Remaining C# Compiler Options, The Command Line Debugger (cordbg.exe) Using the, Visual Studio .NET IDE, Other Key Aspects of the VS.NET IDE, C# "Preprocessor:" Directives, An Interesting Aside: The System .Environment Class.

10 Hours

UNIT II

C# LANGUAGE FUNDAMENTALS: The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C #, String Manipulation in C#, C# Enumerations, Defining Structures in C#, Defining Custom Namespaces.

10 Hours

UNIT III

OBJECT- ORIENTED PROGRAMMING WITH C#: Forms Defining of the C# Class, Definition the "Default Public Interface" of a Type, Recapping the Pillars of OOP, The First Pillars: C#'s Encapsulation Services, Pseudo-Encapsulation: Creating Read-Only Fields, The Second Pillar: C#'s Inheritance Supports, keeping Family Secrets: The "Protected" Keyword, Nested Type Definitions, The Third Pillar: C #'s Polymorphic Support, Casting Between. **EXCEPTIONS AND OBJECT LIFETIME:** Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handing, the System.Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (System.System Exception), Custom Application-Level Exception (System.System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying Application – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of "new', The Basics of Garbage Collection,, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The System. GC Type.

10 Hours

UNIT IV

INTERFACES AND COLLECTIONS: Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (I Comparable), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type). **CALLBACK INTERFACES, DELEGATES, AND EVENTS:** Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate,

The Simplest Possible Delegate Example, , Building More a Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using)Events.

10 Hours

TEXT BOOKS:

1. **Pro C# with .NET 3.0 -** Andrew Troelsen, Dream Tech Press, 2nd Edition India, 2007.
2. **Programming in C# -** E. Balagurusamy, 5th Reprint, Tata McGraw Hill, 2004.

REFERENCE BOOKS:

1. **Inside C# -** Tom Archer, WP Publishers, 2001.
2. **The Complete Reference C# -** Herbert Schildt, Tata McGraw Hill, 2004

UIS030E: SOFTWARE TESTING

3 CREDITS (3-0-0)

UNIT – 1 **10 HRS**

BASICS OF SOFTWARE TESTING: Human Errors and Testing; Software Quality; Requirements, Behavior and Correctness; Correctness versus Reliability; Testing and Debugging; Test Metrics. Software and Hardware Testing; Testing and Verification; Defect Management; Execution History;Test-generation Strategies, Static Testing. Types of Testing.

UNIT – 2 **10 HRS**

TEST GENERATION FROM REQUIREMENTS: Introduction; The Test-Selection Problem; Equivalence Partitioning; Boundary Value Analysis; Category-Partition Method. Cause-Effect Graphing.

UNIT – 3 **11 HRS**

STRUCTURAL TESTING: Overview; Statement testing; Branch testing; Condition testing, Path testing; Procedure call testing; Comparing structural testing criteria; The infeasibility problem.

DEPENDENCE, DATA FLOW MODELS, AND DATA FLOW TESTING: Definition-Use pairs; Data flow analysis; Classic analyses; From execution to conservative flow analysis; Data flow analysis with arrays and pointers; Inter-procedural analysis; Overview of data flow testing; Definition-Use associations; Data flow testing criteria; Data flow coverage with complex structures; The infeasibility problem.

UNIT – 4 **11 HRS.**

TEST CASE SELECTION AND ADEQUACY,: Overview; Test specification and cases; Adequacy criteria; Comparing criteria;

PROCESS:

Integration and component-based software testing: Overview; Integration testing strategies; Testing components and assemblies. System, Acceptance and Regression Testing: Overview; System testing; Acceptance testing; Usability; Regression testing; Regression test selection techniques; Test case prioritization and selective execution.

TEXT BOOKS:

1. **Foundations of Software Testing -** Aditya P Mathur, Pearson Education, 2008. (ch 1, 2)
2. **Software Testing and Analysis Process Principles and Techniques –** Mauro Pezze, Michal Young, Wiley India, 2008. (chapter 6,9,12,13,20,21,22)

REFERENCE BOOKS:

1. **Software Testing Principles and Practices** - Srinivasan Desikan, Gopalaswamy Ramesh, 2nd Edition, Pearson, 2007.
2. **Software Testing** - Ron Patton, 2nd edition, Pearson, 2004.
3. **The Craft of Software Testing** - Brian Marrick, Pearson, 1995.

UIS031E: Storage Technology

Unit -I

10 Hrs

1. **Introduction to Information Storage and Management**
   Information Storage, Evolution of Storage Technology and Architecture, Data center infrastructure, Key challenges in Managing information, Information life cycle.

2. **Storage System Environment**
   Components of a Storage system environment, Disk drive components, Disk drive performance, Application requirements and disk performance.

Unit -II

10 Hrs

3. **Storage Systems Architecture**
   Implementation of RAID, RAID Array Components, RAID Levels, RAID Comparison, RAID Impact on Disk performance.

4. **Networked Storage**
   Types of DAS, Disk drive Interfaces, Storage Area Networks. (SAN) : Fiber channel :Overview, Components of SAN, FC Connectivity, Fibre channel ports, FC Architecture, Zoning, FC Topologies, Network Attached Storage (NAS): Components of NAS, NAS Implementations, NAS File sharing Protocols.

Unit -III

10 Hrs

6. **Storage Virtualization**
   Forms of Virtualization, SNIA Storage Virtualization Taxonomy, Storage Virtualization Configurations, Storage Virtualization Challenges, Types of Storage Virtualization.

Unit -IV

10 Hrs

7. **Content Addressed Storage**
   Types of Archives, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS.

8. **Managing the Storage Infrastructure**

   Monitoring the Storage Infrastructure, Storage Management activities, developing an Ideal Solution.

Text Book:

1. G.Somasundaram,Alok Shrivastava ,EMC Education Servises, Information Storage and Management , Wiley Publishing, Inc 2009.

Reference Books:

1. EMC Education services, storage technology Foundations Student guide Vol-1, Vol-2, 2007.
2. Spalding, R., Storage Networks The Complete Reference, Tata McGrawHill , Osborne, 2003.
3. Farely, M, Building Storage Networks, Tata McGraw Hill ,Osborne, 2001
4. Gupta, M., Storage Area Network Fundamentals, Pearson Education Limited, 2002.

UIS032E - OPERATING SYSTEMS- A DESIGN ORIENTED APPROACH

UNIT – I

1. Introduction:operating system services,A Virtual Computer,Need for an Operating System,The Hardware Interface:The CPU,Memory and addressing,Interrupts,I/O Devices.
2. The Operating System Interface:System Calls Example System Call Interface,Information and Meta-Information,Naming Operating System Objects,Devices as Files,The Process Concept,Communication Between Processes,UNIX-style Process Creation,Standard Input and Standard Output,Communicating with Pipes,Operating System Examples,The User Interface to an Operating System

UNIT -II

3. Design Techniques I:Operating Systems and Design,Design Problems,Design Techniques,Two Level Implementation,Interface Design,Connection in Protocols,Interactive and Programming Interfaces
4. Implementing Processes:The System Call Interface.Implementation of a Simple Operating System.Implementation of Processes,System Initialization,Process Switching,System Call Interrupt Handling,Program Error Interrupts,Disk Driver Subsystem,Implementation of Waiting,Flow of Control Through the Operating System,Signaling in an Operating System,Interrupts in the Operating System,Operating Systems as Event and Table Managers,Process Implementation,Examples of Process Implementation.
5. Processes:Everyday Scheduling,Preemptive Scheduling Methods,Policy versus Mechanism in Scheduling,A Scheduling Example,Scheduling in Real Operating Systems,Deadlock,Why Deadlock is a Problem,Conditions for Deadlock to Occur,How To Deal With Deadlock,A Sequence of Approaches to the Deadlock Problem,Two Phase Locking,Starvation,Message Passing Variations,Synchronization,Separating Data Transfer and synchronization,Semaphores,Implementing Semaphores,Using Semaphores in the Simple Operating System,Programming Language Based Synchronization Primitives,Message Passing Design Issues

UNIT III

6. Design Techniques II:Indirection,Using State Machines,Win Big Then Give Some Back,Separation of Concepts,Reducing a Problem to a Special Case,Reentrant Programs,Using Models for Inspiration,Adding a New Facility To a System
7. Memory Management:Levels of Memory Management,Linking and Loading a Process,Variations in Program Loading,Why Use Dynamic Memory Allocation,The Memory Management Design Problem,Solutions to the Memory Management Design Problem,Dynamic Memory Allocation,Keeping Track of the Blocks,Which Free Block To Allocate,Examples of Dynamic Memory Allocation,Logical and Physical Memory,Allocating Memory to Processes,Multiprogramming Issues,Memory Protection,Memory Management System Calls,Example Code for Memory Allocation
8. Virtual Memory:Fragmentation and Compaction,Dealing with Fragmentation,Memory Allocation Code With Pages,Sharing the Processor and Sharing Memory,Swapping,Overlays,Implementing Virtual Memory,cost of virtual memory,Virtual Memory Management,Daemons and Events,File Mapping

UNIT -IV

9. Design Techniques III:Multiplexing,Late binding,Static Versus Dynamic,Space-Time Tradeoffs,Simple Analytic Models,I/O Devices,Devices and

Controllers,Terminal Devices,Communication Devices,Disk Devices,Disk Controllers,SCSI Interfaces,Tape Devices,CD Devices

10. I/O Systems:I/O System Software,Disk Device Driver Access Strategies,Modeling of Disks,Device numbers,Unification of Files and I/O Devices,Generalized Disk Device Drivers,Disk Caching,Two level structure of device drivers,SCSI Device Drivers,Examples of I/O Systems.
11. Design Techniques IV:Caching,Optimization and Hints,Hierarchical Names,Naming of Objects,Unification of Concepts.
12. Resource Management:Resources in an Operating System,Resource Management Issues,Types of Resources,Integrated Scheduling,Queuing Models of Scheduling,Real-time Operating Systems,Protection of Resources,User Authentication,Mechanisms for Protecting Hardware Resources,Representation of Protection Information,Mechanisms For Software Protection,Examples of Protection Attacks,Government Security Levels,Protection Examples,External Security,The Use of Cryptography in Computer Security

Text Book:

1. Operating Systems- A Design Oriented Approach, Crowley

UIS033E: Distributed and Cloud Computing

3 Credits

UNIT – I

10 Hrs

System Models and Enabling Technologies:

Scalable Computing towards Massive Parallelism; System Models for Distributed and Cloud Computing - Clusters of Cooperative Computers, Grid Computing Infrastructures, Peer-to-Peer Network Families, Cloud Computing over the Internet; Parallel and Distributed Programming Models.

Computer Clusters:

Clustering for massive parallelism – Trend, Design objectives, Issues; Clusters and MPP architectures; Design Principles – SSI features.

UNIT – II

10 Hrs

Cloud platform architecture over virtualized data centers:

Cloud computing and service models; data center design and interconnection networks; architecture design of compute and storage clouds; public cloud platforms (GAE, AWS and Azure); inter cloud resource management.

UNIT – III

10 Hrs

Cloud security and trust management;

Cloud Programming and Software Environments:

Features of Cloud and Grid Platforms; Parallel and Distributed Programming Paradigms - Parallel Computing and Programming Paradigms., MapReduce, Twister, and Iterative MapReduce, Hadoop Library from Apache.

UNIT – IV

10 Hrs

Programming Support of Google App Engine, Programming Amazon AWS and Microsoft Azure, emerging cloud software environments, Enabling technologies for Internet of Things

Text Book: Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Distributed & Cloud Computing, Morgan Kaufmann / ELSEVIER Publishers, 2012
[Chapters: 1.1 – 1.3, 1.4.3, 2.1, 2.2.1 – 2.2.3, 2.3.1, 4.1 – 4.6, 6.1- 6.5, 9.3]

Reference Books: Dinakar Sitaram, Geeta Manjunath, Moving to the cloud, SYNGRESS/ELSEVIER, 2012

(UIS034E) COMPUTER GRAPHICS AND VISUALIZATION
3 CREDITS (3-0-0)

UNIT – I **10 hrs**

INTRODUCTION: Image processing as picture analysis, the advantages of interactive graphics, Representative uses of computer graphics, Classification of applications, Development of hardware and software for Computer Graphics, Conceptual framework for interactive graphics.

BASIC RASTER GRAPHICS ALGORITHMS FOR DRAWING 2D PRIMITIVES: Overview, scan converting lines, scan converting circles, scan converting ellipses, filling rectangles, filling polygons, filling ellipse arcs, pattern filling, thick primitives, line style and pen style.

UNIT – II **10 hrs**

BASIC RASTER GRAPHICS ALGORITHMS FOR DRAWING 2D PRIMITIVES: clipping in a raster world, clipping lines, clipping circles and ellipses, clipping polygons, antialiasing, increasing resolution, unweighted area sampling, weighted area sampling.

GEOMETRICAL TRANFORMATIONS: 2D transformations, Homogeneous coordinates and matrix representation of 2D transformations, composition of 2D transformations, the Window-to-Viewport transformation, efficiency, matrix representation of 3D transformations, composition of 3D transformations, Raster scan display systems, simple raster display system, raster display system with peripheral display processor, video controller, animation with the lookup table, bitmap transformations and windowing, random scan display processor.

UNIT – III **10 hrs**

THE OPENGL**:** The OpenGL API, Primitives and attributes, Color, Viewing, Control functions, The Gasket program, Polygons and recursion, the three-dimensional gasket, plotting implicit functions.

INPUT AND INTERACTION**:** Interaction, Input devices, Clients and servers, Display lists, Display lists and modeling, Programming event-driven input, Menus, A simple CAD program, Building interactive models, Animating interactive programs, Design of interactive programs.

UNIT – IV **10 hrs**

VIEWING: Classical and computer viewing, Viewing with a computer, Positioning of the camera, Simple projections, Projections in OpenGL, Hidden-surface removal, Interactive mesh displays.

LIGHTING AND SHADING**:** Light and matter, Light sources, The Phong lighting model, Computation of vectors, Polygonal shading, Approximation of a sphere by recursive Subdivision, Light sources in OpenGL, Specification of materials in OpenGL, Shading of the sphere model, Global illumination.

Text Books:

1. James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes, ‘Computer Graphics Principles and Practice’, Second Edition in C, Addison- wesley ,1999.

2. Edward Angel, ‘Interactive Computer Graphics A Top-Down Approach Using OpenGL’, 5th Edition, Addison-Wesley, 2008.

Reference Books:

1.Donald Hearn and Pauline Baker, ‘Computer Graphics’, 2nd Edition, Pearson Education, 2003.

2.F.S.Hill,’ ‘Computer Graphics using OpenGL’, 2nd Edition, Pearson Education, 2001.

UIS035E - Linux Internals

UNIT I (10 hrs)

Introduction to Linux kernel: History of Unix, Introduction to Linux, Overview of operating systems and kernels, Linux versus classic Unix kernels, Linux kernel versions, The Linux kernel development community.

Getting started with the kernel: Obtaining the kernel source, the kernel source tree, building the kernel.

Process management: The process, , process descriptor and the task structure, process creation, the Linux implementation of threads, process termination.

Process Scheduling: Multitasking, Linux's Process Scheduler , The Linux Scheduling Algorithm , The Linux Scheduling Implementation, Process Selection, The Scheduler Entry Point , Sleeping and Waking UpPreemption and Context Switching, Real-Time Scheduling Policies , Scheduler-Related System Calls.

UNIT II (10 hrs)

System calls: Communicating with the Kernel , APIs, POSIX, and the C Library,Syscalls, System Call Handler, System Call Implementation, System Call Context.

Interrupts and Interrupt Handlers: Interrupts, Interrupt Handlers, Top Halves Versus Bottom Halves, Registering an Interrupt Handler, Writing an Interrupt Handler, Interrupt Context , Implementing Interrupt Handlers, /proc/interrupts ,
Interrupt Control.

Bottom Halves and Deferring Work: Bottom Halves, Softirqs, Tasklets, Work Queues.

UNIT III (10 hrs)

An Introduction to Kernel Synchronization: Critical Regions and Race Conditions, Locking, Deadlocks, Contention and Scalability.

Kernel Synchronization Methods: Atomic Operations, Spin Locks, Reader-Writer Spin Locks , Semaphores, Reader-Writer Semaphores , Mutexes, Completion Variables, BKL: The Big Kernel Lock , Sequential Locks ,
Preemption Disabling , Ordering and Barriers.

Timers and Time Management: Kernel Notion of Time , The Tick Rate, Jiffies, Hardware Clocks and Timers, The Timer Interrupt Handler , The Time of Day , Timers, Delaying Execution.

UNIT IV (10 hrs)

Memory Management: Pages , Zones , Getting Pages, kmalloc(),vmalloc() , Slab Layer, Statically Allocating on the Stack, High Memory Mappings, Per-CPU Allocations, The New percpu Interface, Reasons for Using Per-CPU Data,
Picking an Allocation Method.

The Virtual Filesystem: Common Filesystem Interface , Filesystem Abstraction Layer , Unix Filesystems , VFS Objects and Their Data Structures , The Superblock Object , Superblock Operations , The Inode Object , Inode Operations , The Dentry Object, Dentry Operations , The File Object , File Operations , Data Structures Associated with Filesystems , Data Structures Associated with a Process.

The Block I/O Layer: Anatomy of a Block Device , Buffers and Buffer Heads, The bio Structure, Request Queues,
I/O Schedulers.

Text Books:

1. **Robert Love, Linux kernel development, Third edition, Addision Wesley Publications**

Reference Book:

1. **Daniel P. Bovet et al., Understanding the Linux kernel, Third edition , Reilly Publication**

UIS036E: Advanced Java Programming
3 CREDITS (3-0-0)

UNIT I **10 hrs**

Java2 Enterprise Edition and Servlets:

Java2 Enterprise Edition(J2EE): J2SE and J2EE, J2EE: Birth of J2EE, Databases, The maturing of Java, Java beans and java message service, J2EE Multi-Tier architecture: Distributive Systems, The tier, J2EE multitier architecture, **Servlets**: Java Servlets and Common Gateway Interface Programming, Benefits of Servlet, Servlet Lifecycle: init, service, destroy, Simple Java Servlet, Servlet Classes: Servlet, Servlet Request, Servlet Response, Servlet Context, Reading data from client, Reading HTTP request headers, Sending data to client and Writing the HTTP response header, Working with Cookies, Tracking Sessions.

UNIT II **10 hrs**

JDBC Objects and Embedded SQL:

JDBC Objects: The concepts of JDBC, JDBC Drivers Types, JDBC Packages, A brief overview of the JDBC Process, Database connection, Statement Objects, ResultSet, Transaction Processing, Metadata, Data Types, Exceptions**, JDBC and Embedded SQL**: Model programs, Tables, Inserting data into tables, Selecting data from a table, Updating tables, Deleting data from a table.

UNIT III **10 hrs**

Java Server page (JSP): JSP Overview, JSP Syntax and semantics: The JSP Development model, Components of JSP Page, A complete example, Expressions, Scriptlets and Declarations: Expressions, Scriptlets, Declarations, Request dispatching: Anatomy of request processing, Including other resources, The include directive, The <jspinclude> action, Which method to use, Forwarding request, Model 1 Vs Model 2.

UNIT IV **10 hrs**

Enterprise JavaBeans and Java Remote Method Invocation:

Enterprise JavaBeans(EJB): Enterprise Java Beans: The EJB Container, EJB Classes, EJB Interfaces, Deployment Descriptors: Anatomy of deployment descriptor, Environment elements, Referencing EJB, Referencing other resources, Sharing resources, Security elements, Query element, Relationship elements, Assembly elements, Exclude list elements , Session Java Bean: Staetless vs Stateful, Creating a session Java Bean, Entity Java Bean: Container Managed Persistence, Bean managed persistance, Message Driver Bean: Behind the scenes, Creating an MDB, The JAR File, **Java Remote Method Invocation(RMI)**: Remote Method Invocation Concept: Remote interface, Passing objects, The RMI process, Server side, Client side.

Text Books:

1. The Complete Reference –J2EE, Jim Keogh, McGraw Hill Publication.(Chapter 2,6,7,10,12,15)
2. The Complete Reference –JSP 2.0, Phil Hanna, McGraw Hill Publication.(Chapter 3,4,5,6,7,8)

Reference Books:

1. Java 6 Programming Black Book, Dreamtech Press. 2007.
2. Core servlets and Java Server Pages, Marty Hall, Larry Brown, Volume 1:Core Technologies, Second Edition.

UIS037E: Advanced Data Structures and Algorithms
3 CREDITS (3-0-0)

UNIT-I

Stack: Definitions and Examples-primitive operations, An example. Representing stacks in C-Implementing the *pop* Operation, Testing for Exceptional Conditions, Implementing the *push* Operation. An example: Infix, Postfix, and Prefix-Basic Definitions and Examples, Evaluating a Postfix Expression, Program to Evaluate a Postfix Expression, Converting an Expression from Infix to Postfix, Program to Convert an Expression from Infix to Postfix.

Queues and Lists

Queues:

The Queue and its Sequential Representation-C Implementation of Queues, The insert Operation, The Priority Queue, Array Implementation of a Priority Queue.

Lists:

Linked Lists - Inserting and Removing Nodes from a List, Linked Implementation of Stacks, The *getnode* and *freenode* Operations, Linked Implementation of Queues, The Linked List as a Data Structure, Examples of List Operations, List Implementation of Priority Queues, Header Nodes.

Lists in C - Array Implementation of Lists, Limitations of the Array Implementation, Allocating and Freeing Dynamic variables, Linked Lists using Dynamic Variables, Queues as Lists in C, Examples of List Operations in C, Noninteger and Nonhomogeneous Lists, Comparing the Dynamic and Array Implementation of Lists, Implementing Header Nodes.

Other List Structures - Circular Lists, The stack as a Circular List, The Queue as a Circular List, Primitive Operations on Circular Lists, The Josephus Problem, Header Nodes, Addition of Long Positive Integers Using Circular Lists, Doubly Linked Lists, Addition of Long Integers Using Doubly Linked Lists, XOR doubly linked list.

UNIT-II

Splay Trees: Introduction, Splaying Steps, Splaying algorithm.

B-trees: Access time, Multiway search trees, Balanced multiway trees, Insertion into a B-tree, C Algorithms: Searching and Insertions.

Red Black tree: Introduction, Definition and Analysis, Insertion, C Insertion.

Heaps: Properties of Min-max heaps, building a heap, basic operations on heaps. Binomial heaps: Binomial trees and binomial heaps, operations on binomial heaps. Fibonacci heaps: Structure of Fibonacci heaps, mergeable heap operations, decreasing a key and deleting a node, bounding a maximum degree.

Data structures for strings: Tries and Compressed tries, Suffix trees and Suffix arrays.

UNIT-III

Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

Ant and Bee algorithms: Ant algorithms, Bee inspired algorithm.

Tabu Search

UNIT-IV

Introduction to parallel algorithms and architectures: Approaches to the design of parallel algorithms, Architectural constraints and design of parallel algorithms, Performance measures of parallel algorithms, parallel sorting.

Internet algorithms: Search Engines, Ranking web pages, Hashing, Caching, content delivery and consistent hashing, Message security algorithms.

Text books:

Data Structures Using C by Aron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein…**2.1, 2.2, 2.3, 4.1, 4.2, 4.3, 4.5**

Data Structures and Program Design in C by Robert Kruse, C.L.Tondo, Bruce Leung, and Shashi Mogalla…**9.5-9.5.1, 9.5.2, 9.5.3, 10.3-10.3.1,10.3.2,10.3.3,10.3.4,10.3.5, 10.4**

M. D. Atkinson, J. R. Sack, N. Santoro, and T. Strothotte. Min-Max Heaps and Generalized Priority Queues.

Introduction to algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein…**20.1, 20.2, 21.1, 21.2,21.3,21.4**
Advanced Data Structures by peter brass…**8.1, 8.3, 8.4**
Artificial Intelligence by Elaine Rich, Kevin Knight…**3.1, 3.2, 3.3, 3.4, 3. 5, 3.6**
Nature inspired metaheuristic algorithms by Xin She Yang, 2nd edition…**7.1, 7.2, 14.1.1**
Algorithms: sequential, parallel, and distributed by Kenneth A. Berman and Jerome L. Paul…**15.1, 15.2, 15.3, 15.4, 17.1, 17.2, 17.3, 17.4, 17.5**

Reference books:

Clever algorithms: Nature-Inspired Programming Recipes by Jason Brownlee

UIS038E: BIG DATA AND ANALYTICS

3 Credits (3-0-0)

UNIT I **10 Hrs**

Types of Digital Data: Classification of Digital Data

Introduction to Big Data: Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, What is Big Data? Other Characteristics of Data Which are not Definitional Traits of Big Data, Why Big Data? Are We Just an Information Consumer or Do we also Produce Information? Traditional Business Intelligence (BI) versus Big Data, A Typical Data Warehouse Environment , A Typical Hadoop Environment ,What is New Today? What is changing in the Realms of BigData?

UNIT II **10 Hrs**

Big Data Analytics: Where do we Begin? What is Big Data Analytics? What Big Data Analytics Isn't? Why this Sudden Hype Around Big Data Analytics? Classification of Analytics, Greatest Challenges that Prevent Businesses from Capitalizing on Big Data,Top Challenges Facing Big Data,Why is Big Data Analytics Important?What Kind of Technologies are we looking Toward to Help Meet the Challenges Posed by Big Data? Data Science, Data Scientist. Terminologies Used in Big Data Environments,Basically Available Soft State Eventual Consistency (BASE),Few Top Analytics Tools. The Big Data Technology Landscape NoSQL (Not Only SQL) ,Hadoop.

UNIT III **10 Hrs**

Introduction to Hadoop: Introducing Hadoop, Why Hadoop? Why not RDBMS? RDBMS versus Hadoop, Distributed Computing Challenges,History of Hadoop, Hadoop Overview, Use Case of Hadoop,Hadoop Distributors,HDFS (Hadoop Distributed File System),Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator),Interacting with Hadoop Ecosystem MongoDB What is MongoDB? Why MongoDB? Terms Used in RDBMS and MongoDB, Data Types in MongoDB, MongoDB Query Language.

UNIT IV **12Hrs**

Cassandra Apache Cassandra - An Introduction , Features of Cassandra, CQL Data types, CQLSH, Keyspaces, CRUD (Create, Read, Update and Delete) Operations, Collections, Using a Counter, Time to Live (TTL), Alter Commands, Import and Export, Querying System Tables,

Hive and Pig: What is Hive? , Hive Architecture, Hive Data Types, Hive File Format, Hive Query Language (HQL), RCFile Implementation, SerDe, User-defined Function(UDF). Introduction to Pig What is Pig? The Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Use Case for Pig: ETL Processing, Pig Latin Overview, Data Types in Pig,Running Pig, Execution Modes of Pig,HDFS Commands,Relational Operators,Eval Function,Complex Data Types.

TEXT BOOKS:

1. Big Data and Analytics, Seema Acharya, SubhashiniChellappan, Infosys Limited, Publication: Wiley India Private Limited,1st Edition 2015(Chapters 1,2,3,4,5,6,7,8,9,10)

REFERENCE BOOKS:

1. Hadoop in Practice, Alex Holmes, Manning Publications Co., September 2014, Second Edition.
2. Programming Pig, Alan Gates, O'Reilly, Kindle Publication.
3. Programming Hive, Dean Wampler, O'Reilly, Kindle Publication

UIS039E: NoSQL

3 CREDITS (3 – 1 – 0)

UNIT – I

10 Hours

Introduction: What is NoSQL? , Why NoSQL? , Different NoSQL Databases, What is Bigdata? , Distribution data models for bigdata, CAP Theorem, BASE Theorem.
Key/Value Databases: What are Key/Value Databases? , Suitable Usecases for Key/Value Databases, When Not to Use? , Redis as Key/Value Database: Features, Datatypes, Transactions, Expiration, Pipelining, Pub/Sub, Redis and Python.

UNIT – II

10 Hours

What are Document Databases? , Suitable Usecases for Document Databases, When Not to Use? , MongoDB as Document Database: Terms Used in RDBMS & MongoDB, Features, Datatypes, Creating & Dropping Databases, Creating & Dropping Collection, Insert, Query, Update and, Delete Document, Indexing, MongoDB and PHP.

UNIT – III

10 Hours

What are Columnar Databases? , Suitable Usecases for Columnar Databases, When Not to Use? , Hbase as Columnar Database: Column Oriented and Row Oriented (Hbase and RDBMS), Features, Defining Data, Manipulating Data, Hbase and Java.

UNIT – IV

10 Hours

What are Graph Databases? , Suitable Usecases for Graph Databases, When Not to Use? , Neo4J as Graph Database: Features, Cypher Query Language. , Polyglot model.

References:

1) Pramod J. Sadalage, Martin Fowler, "NoSQL Distilled A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley.
2) Shashank Tiwari, "Professional NoSQL", John Wiley & Sons,
3) Gaurav Vaish, "Getting Started with NoSQL Your guide to the world and technology of NoSQL", Packt Publishing Ltd.
4) Douglas McMurtry, Andrew Oakley, John Sharp, Mani Subramanian, Hanz Zhang "Data Access for Highly- Scalable Solutions: Using SQL, NoSQL, and Polyglot Persistence"
5) Eric Redmond Jim R. Wilson , "Seven Databases in Seven Weeks A Guide to Modern Databases and the NoSQL Movement", Pragmatic Programmers, LLC.