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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.

UNIT - 2
IMPLEMENTATION OF PIPELINE: Issues pipelining implementation.

UNIT - 3
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.

UNIT - 3
INSTRUCTION –LEVEL PARALLELISM – 1: 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;

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.

TEXT BOOK:

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

UNIT – I

Introduction: What is a graph?, Applications of graphs, Finite and Infinite Graphs, Incidence and degree, Isolated and pendent vertices, null graphs.
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

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_i, B_i, and C_i. Path matrix, adjacency matrix

UNIT – III

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

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:
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.

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 UNCERTAINTIES:
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.

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

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

KNOWLEDGE ORGANIZATION AND MANIPULATIONS:
SEARCH and CONTROL STRATEGIES:
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 uncertainty; Knowledge acquisition and validation; Knowledge system building tools.

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

REFERENCE BOOKS:
UNIT I

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

SYMMETRIC CIPHERS 10 Hrs

UNIT II

PUBLIC - KEY ENCRYPTION AND HASH FUNCTIONS 10 Hrs

UNIT III

NETWORK SECURITY PRACTICE 10 Hrs

UNIT IV

SYSTEM SECURITY 10 Hrs

Text Book:
   (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
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

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

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

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

TEXT BOOKS:

REFERENCE BOOKS:
UNIT I

Fundamentals  
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  

UNIT II

Remote Procedure Calls  
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  

UNIT III

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

UNIT IV

Resource Management  

Process Management  
Process Migration, Threads.

Distributed File Systems  

TEXT BOOK:
   [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:
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:

10 Hours

UNIT - 2

MEMBERSHIP FUNCTIONS:

FUZZY-TO-CRISP CONVERSIONS, FUZZY ARITHMETIC:

10 Hours

UNIT – 3


CLASSICAL LOGIC AND FUZZY LOGIC:

10 Hours

UNIT – 4

FUZZY RULE- BASED SYSTEMS:

FUZZY DECISION MAKING:

10 Hours

TEXT BOOK:

REFERENCE BOOK:
UNIT I

INTRODUCTION TO GENETIC ALGORITHMS 10 Hrs
A Gentle Introduction to genetic algorithms
Genetic Algorithms Revisited: Mathematical Foundations

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 Multi-parameter, Mapped, Fixed-Point Coding, Discretization, Constraints.

UNIT III

APPLICATIONS OF GA 11 Hrs
Some 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

TEXT BOOKS


REFERENCE BOOK

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

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

10 Hours

UNIT - 3
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:
10 Hours

TEXT BOOK:

REFERENCE BOOK:
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)


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.

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

Reference Books
3. E. Gose, R. Johnsonbaugh, and S. Jost, “Pattern Recognition and Image Analysis”, Prentice Hall of India, New Delhi, 1999
**UNIT - I**

**Basic Real-Time Concepts:**

**Real-Time Specification And Design Techniques**
Natural Languages; Mathematical Specification; Flowcharts; Structure Charts; Pseudocode and Programming Design Languages; Finite State Automata; Data Flow Diagrams- 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?

**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**

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**
| Reference Books | Real Time Systems, Jane Liu, PHI publication. |
UNIT – 1
INTRODUCTION, ARCHITECTURE STYLES
10 Hrs
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
ARCHITECTURAL PATTERNS
10 Hrs

UNIT – 4
DESIGN PATTERNS, DESIGNING AND DOCUMENTATION
10 Hrs
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:
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

REFERENCE BOOK:
Design Patterns- Elements of Reusable Object-Oriented Software - E. Gamma, R. Helm, R. Johnson, J. Vlissides, Addison-Wesley, 1995
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;
TEXT BOOKS


REFERENCE BOOK

UNIT I
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

UNIT III
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
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:

Reference Books:
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 ApletStub 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:

Chapters refer to syllabus

REFERENCE BOOKS:
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
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:

Reference Books:
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.

Problems, Problem Spaces, and Search

UNIT - II

Heuristic Search Techniques and Knowledge Representation

Knowledge Representation - Representations and Mappings, Approaches to Knowledge Representation

UNIT - III

Knowledge Representation

UNIT - IV

Expert Systems

Text Books:

Reference Book:

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

**REFERENCE BOOKS:**
1. Client/Server System Design and implementation by Larry T Vaughtn,  
2. The CORBA Reference Guide by Alan Pope, Addison Wellesley
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)
UNIT – I

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 framework for Distributed Database design, Design of database fragmentation, allocation of fragments.

UNIT – II

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.

UNIT – III

Concurrency control: Foundations of distributed concurrency control, distributed deadlocks, concurrency control based on time stamps.

UNIT – IV

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:

Reference Books:
UIS021E: EMBEDDED SYSTEMS
3 CREDITS (3-0-0)

UNIT – I
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.


08 Hours

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

08 Hours

UNIT – III

08 Hours

UNIT – IV
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:

REFERENCE BOOKS:
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:

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:

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 separable 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 propagation 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
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:**

**REFERENCE BOOKS:**
UNIT I:  
(10 hrs)


UNIT II:  
(10 hrs)


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

4) B. Yegnanarayana, “Artificial Neural Networks”, Prentice Hall of India, New Delhi, 1999
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 - 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

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
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.
TEXT BOOKS

2) **Open Source Web Development with LAMP** – James Lee and Brent Ware, Addison Wesley/Pearson Education Inc. 2003.

REFERENCE BOOKS

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

UNIT I


10 Hours

UNIT II


10 Hours

UNIT III


10 Hours

UNIT IV


10 Hours

TEXT BOOK:


Reference Books:

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.

UNIT –II

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

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.

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.

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:
UIS029E: C# PROGRAMMING AND .NET

3 CREDITS (3-0-0)

UNIT I


10 Hours

UNIT II


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 Handling, 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 (IComparable), 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:

REFERENCE BOOKS:
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:
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:
UIS031E: Storage Technology

Unit -I  

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  

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  

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

Unit -IV  

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

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

Text Book:


Reference Books:

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.


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


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

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


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:

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

[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.

Text Books:

Reference Books:
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.


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.


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

Text Books:

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:  

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  

UNIT IV  
10 hrs  
Enterprise JavaBeans and Java Remote Method Invocation:  

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:  
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:**

**Lists:**

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.

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
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

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 Big Data?

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

UNIT IV 12 Hrs
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:
3. Programming Hive, Dean Wampler, O’Reilly, Kindle Publication
UIS039E: NoSQL

3 CREDITS (3 – 1 – 0)

UNIT – I

10 Hours


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


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:

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.
5) Eric Redmond Jim R. Wilson , “Seven Databases in Seven Weeks A Guide to Modern Databases and the NoSQL Movement”, Pragmatic Programmers, LLC.