

COURSE OBJECTIVES:

To enable the students to:

1. Acquire knowledge about computer basics.
2. To impart knowledge on the need of programming languages and problem solving techniques.
3. To develop programming skills using the fundamentals of C Language.
4. To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
5. To teach the issues in file organization and the usage of file systems.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

1. Describe knowledge of computer for better understanding of devices, basic fundamentals of computer, comprises in this course.
2. Design flowchart, write algorithm parallel with control statements to understand flow of program execution.
3. Understand about the code reusability with the help of user defined functions and file handling mechanism that are essential in database management systems.
4. Develop skills in students to learn dynamic memory allocation using pointers and understand programming skills like Arrays, Strings, Structure and union.

UNIT – I:

General Fundamentals: Introduction to computers, Block diagram of a computer, characteristics and limitations of computers, applications of computers, types of computers, computer generations.

Introduction to Algorithms and Programming Languages: Algorithm – Key features of Algorithms, Flow Charts, Programming Languages – Generations of Programming Languages – Structured Programming Language- Design and Implementation of Correct, Efficient and Maintainable Programs.

UNIT – II:

Introduction to C: Introduction – Structure of C Program – Writing the first C Program –File used in C Program – Compiling and Executing C Programs – Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C- Operators in C- Programming Examples.

Decision Control and Looping Statements: Introduction to Decision Control Statements–Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – goto Statement.

UNIT – III:

Arrays: Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array– Operations on Arrays – one dimensional, two dimensional and multidimensional arrays, character handling and strings.

UNIT – IV:

Functions: Introduction – using functions – Function declaration/ prototype – Function definition function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions.

Structure, Union, and Enumerated Data Types: Introduction – Nested Structures – Arrays of Structures – Structures and Functions– Union – Arrays of Unions Variables – Unions inside Structures – Enumerated Data Types.

UNIT – V:

Pointers: Understanding Computer Memory – Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Passing Arguments to Functions using Pointer – Pointer and Arrays – Memory Allocation in C Programs –Memory Usage – Dynamic Memory Allocation – Drawbacks of Pointers.

Files: Introduction to Files – Using Files in C – Reading Data from Files – Writing Data to Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments.

BOOKS:

1. E Balagurusamy – Programming in ANSI C – Tata McGraw-Hill publications.
2. Brain W Kernighan and Dennis M Ritchie – The ‘C’ Programming language” –Pearson publications.
3. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publications.
4. YashavantKanetkar – Let Us ‘C’ – BPB Publications.

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15. Write a program to createBook (ISBN,Title, Author, Price, Pages,Publisher)structure and store book details in a file and perform the following operations

a. Add book details

b. Search a book details for a given ISBN and display book details, if available

c. Update a book details using ISBN

d. Delete book details for a given ISBN and display list of remaining Books

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ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

II SEMESTER

COMPUTER SCIENCE

Time: 4Hrs/Week

CS 2602(3)

DATA STRUCTURES USING C

Max.Marks:100

20-21 admitted batch-“20AH”

SYLLABUS

Course Objectives

To enable the students to:

- To bring out the importance of data structures in a variety of applications.
- Introduce the concept of data structures through ADT including List, Stack and Queues.
- Develop application using data structure algorithms.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

- Identify the appropriate data structures and algorithms for solving real world problems.
- Comprehend Data Structure and their real-time applications- linked lists, stacks, queues, trees and graphs are represented in memory and their operations.
- Implement operations like searching, insertion, deletion and traversing mechanism on various data structures.
- Demonstrate primitive operations on trees and their applications and summarize the concepts of graphs and traversal techniques.
- Describe and analyse various sorting algorithms like Bubble Sort, Selection Sort, Insertion Sort and Quick Sort and therefore develop employability skills.

UNIT – I:

Introduction to Data Structures: Introduction to the Theory of Data Structures, Data Representation, Abstract Data Types, Data Types, Primitive Data Types, Data Structure and Structured Type, Atomic Type, Difference between Abstract Data Types, Data Types, and Data Structures, Refinement Stages.

Principles of Programming and Analysis of Algorithms: Software Engineering, Program Design, Algorithms, Different Approaches to Designing an Algorithm, Complexity, Big ‘O’ Notation, Algorithm Analysis, Structured Approach to Programming, Recursion, Tips and Techniques for Writing Programs in ‘C’.

UNIT – II:

Arrays: Introduction to Linear and Non- Linear Data Structures, One-Dimensional Arrays, Array Operations, Two- Dimensional arrays, Multidimensional Arrays, Pointers and Arrays, an Overview of Pointers

Linked Lists: Introduction to Lists and Linked Lists, Dynamic Memory Allocation, Basic Linked List Operations, Doubly Linked List, Circular Linked List, Atomic Linked List, Linked List in Arrays, Linked List versus Arrays.

UNIT – III:

Stacks: Introduction to Stacks, Stack as an Abstract Data Type, Representation of Stacks through Arrays, Representation of Stacks through Linked Lists, Applications of Stacks, Stacks and Recursion

Queues: Introduction, Queue as an Abstract data Type, Representation of Queues, Circular Queues, Double Ended Queues- Deques, Priority Queues, Application of Queues.

UNIT – IV:

Binary Trees: Introduction to Non- Linear Data Structures, Introduction Binary Trees, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Counting Number of Binary Trees, Applications of Binary Tree.

UNIT – V:

Searching and sorting: Sorting – An Introduction, Bubble Sort, Insertion Sort, Merge Sort, Searching – An Introduction, Linear or Sequential Search, Binary Search, Indexed Sequential Search.

Graphs: Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, Spanning Trees, Shortest Path, Application of Graphs.

BOOKS:

1. “Data Structures using C”, ISRD group Second Edition, TMH
2. “Data Structures through C”, Yashavant Kanetkar, BPB Publications
3. “Data Structures Using C” Balagurusamy E. TMH

Course Objectives

To enable the students to:

- To make the students write various programs and ADTS for all data structures.
- Students will learn to write, debug, and test large programs systematically.
- Determine which algorithm or data structure to use in different scenarios.

Course Learning Outcomes:

After Completion of this course the student would be able to:

- Implement Linear and Non Linear Data Structure.
- Apply divide and conquer strategy to searching and sorting problems using iterative and/or recursive solutions.
- Choose the appropriate data structure and algorithm design method for a specified application

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
 - a. Add an element at the beginning of an array
 - b. Insert an element at given index of array
 - c. Update an element using a value and index
 - d. Delete an existing element
2. Write a program using stacks to convert a given
 - a. postfix expression to prefix
 - b. prefix expression to postfix
 - c. infix expression to postfix
3. Write Programs to implement the Stack operations using an array.
4. Write Programs to implement the Stack operations using Linked List.
5. Write Programs to implement the Queue operations using an array.

6. Write Programs to implement the Queue operations using Linked List.
7. Write a program for arithmetic expression evaluation.
8. Write a program for Binary Search Tree Traversals.
9. Write a program to implement dequeue using a doubly linked list.
10. Write a program to search an item in a given list using the following Searching Algorithms
 - a. Linear Search
 - b. Binary Search.
11. Write a program for implementation of the following Sorting Algorithms
 - a. Bubble Sort
 - b. Insertion Sort
 - c. Quick Sort
12. Write a program for polynomial addition using single linked list.
13. Write a program to find the shortest path between a given Source Node and Destination Node in a given graph using Dijkstra's algorithm.
14. Write a program to implement Depth First Search graph traversals algorithm.
15. Write a program to implement Breadth First Search graph traversals algorithm.

COURSE OBJECTIVES:

To enable the students to:

- Understand the different issues involved in the design and implementation of a database system.
- To understand and use data manipulation language to query, update, and manage a database.
- To introduce the concepts of transactions and transaction processing.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- **Develop and design database application and therefore enhance entrepreneurship skills.**
- **Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.**
- **Design and implement a Database Schema for a given Problem-domain.**
- **Apply Normalization Techniques on given Database Design to avoid Anomalies.**
- Understand various transaction processing and concurrency control mechanisms.

UNIT I

Overview of Database Management System: Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of data base, costs and risks of database approach.

UNIT II

Entity-Relationship Model: Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, IS A relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modelling.

UNIT III

Relational Model: Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra, relational calculus, tuple relational calculus, domain relational Calculus (DRC), Functional dependencies and normal forms upto 3rd normal form.

UNIT IV

Structured Query Language: Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.

UNIT V

PL/SQL: Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.

Prescribed Text Books:

Database System Concepts by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill ,6e.
Database Management Systems by Raghu Ramakrishnan, McGrawhill ,3e

Reference Books:

Principles of Database Systems by J. D. Ullman

Fundamentals of Database Systems by R. Elmasri and S. Navathe

SQL: The Ultimate Beginners Guide by Steve Tale.

To enable the students to:

- Describe the basics of SQL and construct queries using SQL.
- Know query languages associated with relational models

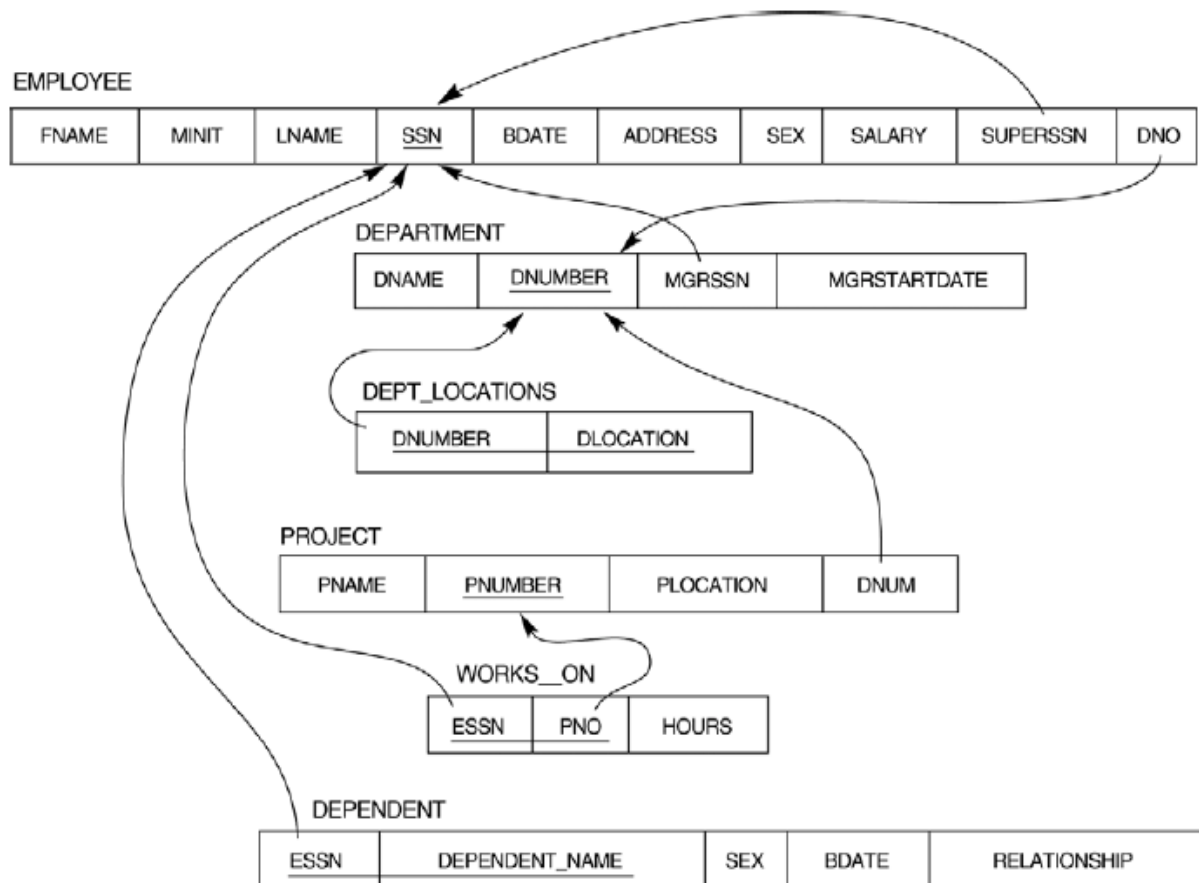
COURSE OOUTCOMES:

After Completion of this course the student would be able to:

- **Design and implement a database schema for a given problem.**
- **Design queries using SQL.**
- **Apply PL/SQL for processing database.**

1. Draw ER diagram for hospital administration
2. Creation of college database and establish relationships between tables
3. Relational database schema of a company is given in the following figure.

Relational Database Schema - COMPANY



Questions to be performed on above schema

1. Create above tables with relevant *Primary Key, Foreign Key and other constraints*
2. Populate the tables with data
3. Display all the details of all employees working in the company.
4. Display *ssn, lname, fname, address* of employees who work in department no 7.
5. Retrieve the *Birthdate and Address* of the employee whose name is 'Franklin T. Wong'
6. Retrieve the name and salary of every employee
7. Retrieve all distinct salary values
8. Retrieve all employee names whose address is in 'Bellaire'
9. Retrieve all employees who were born during the 1950s
10. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)
11. Retrieve the names of all employees who do not have supervisors
12. Retrieve SSN and department name for all employees
13. Retrieve the name and address of all employees who work for the 'Research' department
14. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
15. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
16. Retrieve all combinations of Employee Name and Department Name
17. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
18. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
19. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
20. Select the names of employees whose salary does not match with salary of any employee in department 10.
21. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
22. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.

23. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
24. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
25. Delete all dependents of employee whose *ssn is '123456789'*.
26. Perform a query using alter command to drop/add field and a constraint in Employee table.

COURSE OBJECTIVES:

- Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
- Understand the principles of inheritance, packages and interfaces.

COURSE OUTCOMES :

- **To recognize how to execute a simple as well as Java application and underlying the principles of Object-Oriented Programming.**
- **Describe and implement various Inheritance and Polymorphism forms using Java Classes and Interfaces.**
- **Implement efficient Java applets, exception handling and multithreading concepts in real life programming domains and hence enhance employability skills.**

UNIT I

Introduction to Java: Features of Java, The Java virtual Machine, Parts of Java

Naming Conventions and Data Types: Naming Conventions in Java, Data Types in Java, Literals

Operators in Java: Operators, Priority of Operators.

Control Statements in Java: if... else Statement, do... while Statement, while Loop, for Loop, switch Statement, break Statement, continue Statement, return Statement

Input and Output: Accepting Input from the Keyboard, Reading Input with Java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format()

Arrays: Types of Arrays, Three Dimensional Arrays (3D array), arrayname.length, Command Line Arguments

UNIT II

Strings: Creating Strings, String Class Methods, String Comparison, Immutability of Strings

Introduction to OOPs: Problems in Procedure Oriented Approach, Features of Object-Oriented Programming System (OOPS)

Classes and Objects: Object Creation, Initializing the Instance Variables, Access Specifiers, Constructors

Methods in Java: Method Header or Method Prototype, Method Body, Understanding Methods, Static Methods, Static Block, The keyword 'this', Instance Methods, Passing Primitive Data Types to Methods, Passing Objects to Methods, Passing Arrays to Methods, Recursion, Factory Methods

Inheritance: Inheritance, The keyword 'super', The Protected Specifier, Types of Inheritance

UNIT III

Polymorphism: Polymorphism with Variables, Polymorphism using Methods, Polymorphism with Static Methods, Polymorphism with Private Methods, Polymorphism with Final Methods, final Class

Type Casting: Types of Data Types, Casting Primitive Data Types, Casting Referenced Data Types, the Object Class

Abstract Classes: Abstract Method and Abstract Class

Interfaces: Interface, Multiple Inheritance using Interfaces

Packages: Package, Different Types of Packages, The JAR Files, Interfaces in a Package, Creating Sub Package in a Package, Access Specifiers in Java, Creating API Document

Exception Handling: Errors in Java Program, Exceptions, throws Clause, throw Clause, Types of Exceptions, Re – throwing an Exception

UNIT IV

Streams: Stream, Creating a File using FileOutputStream, Reading Data from a File using FileInputStream, Creating a File using FileWriter, Reading a File using FileReader, Zipping and Unzipping Files, Serialization of Objects, Counting Number of Characters in a File, File Copy, File Class

Threads: Single Tasking, Multi Tasking, Uses of Threads, Creating a Thread and Running it, Terminating the Thread, Single Tasking Using a Thread, Multi Tasking Using Threads, Multiple Threads Acting on Single Object, Thread Class Methods, Deadlock of Threads, Thread Communication, Thread Priorities, thread Group, Daemon Threads, Applications of Threads, Thread Life Cycle

UNIT V

Applets: Creating an Applet, Uses of Applets, <APPLET> tag, A Simple Applet, An Applet with Swing Components, Animation in Applets, A Simple Game with an Applet, Applet Parameters

Java Database Connectivity: Database Servers, Database Clients, JDBC (Java Database Connectivity), Working with Oracle Database, Working with MySQL Database, Stages in a JDBC Program, Registering the Driver, Connecting to a Database, Preparing SQL Statements, Using jdbc–odbc Bridge Driver to Connect to Oracle Database, Retrieving Data from MySQL Database, Retrieving Data from MS Access Database, Stored Procedures and CallableStatements, Types of Result Sets

Prescribed Text Book:

Core Java: An Integrated Approach, Authored by Dr. R. Nageswara Rao & Kogent Learning Solutions Inc.

Reference Books:

E. Balaguruswamy, Programming with JAVA, A primer, 3e, TATA McGraw- Hill Company.

John R. Hubbard, Programming with Java, Second Edition, Schaum's outline Series, TMH.

Deitel & Deitel. Java TM: How to Program, PHI (2007)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM
IV SEMESTER **COMPUTER SCIENCE** Time: 4Hrs/Week
CS 4604(3) **OPERATING SYSTEMS**
20-21 admitted batch-“20AH” **SYLLABUS**
Max.Marks:100

COURSE OBJECTIVES:

To enable the students to:

- Understand the overall structure and components of operating system.
- Analyze the key concept of Process Management and concurrency problem.
- Understand different approaches to memory management.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Demonstrate the structure and design of operating systems.
- **Compare various algorithms for process scheduling.**
- **Apply various deadlock handling strategies to solve resource allocation problems.**
- **Evaluate the performance of different memory management techniques and page replacement algorithms and therefore develop employability skills.**
- Describe file concepts and analyse various disk scheduling strategies.

UNIT- I

What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

UNIT- II

Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Preemptive and Preemptive Scheduling Algorithms.

UNIT III

Process Management: Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

UNIT IV

Memory Management:Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory.

UNIT V

File and I/O Management, OS security : Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Security Policy Mechanism, Protection, Authentication and Internal Access Authorization

Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System, Small Application Development using Android Development Framework.

<https://nptel.ac.in/courses/106/105/106105214/>

<http://www.infocobuild.com/education/audio-video-courses/computer-science/OperatingSystems-IIT-Delhi/lecture-36.html>

<https://www.youtube.com/watch?v=AnGOeYJCv6s>

<https://www.youtube.com/watch?v=U1Jpvni0Aak>

https://nptel.ac.in/content/storage2/courses/126104006/LectureNotes/Week-2_IntroductionToAndroid.pdf

<https://www.youtube.com/watch?v=fzQcQV0UCUM>

Prescribed Text Book:

Operating System Principles by Abraham Silberschatz, Peter Baer Galvin and Greg Gagne (7th Edition) Wiley India Edition.

Reference Books:

Operating Systems: Internals and Design Principles by Stallings (Pearson)

Operating Systems by J. Archer Harris (Author), Jyoti Singh (Author) (TMH)

Online Resources for UNIT V

COURSE OBJECTIVES:

To enable the students to:

- Understand the different issues involved in the design and implementation of a database system.
- To understand and use data manipulation language to query, update, and manage a database.
- To introduce the concepts of transactions and transaction processing.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Develop and design database application and therefore enhance entrepreneurship skills.
- Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
- Design and implement a Database Schema for a given Problem-domain.
- Apply Normalization Techniques on given Database Design to avoid Anomalies.
- Understand various transaction processing and concurrency control mechanisms.

UNIT - I: Database Systems Introduction and Fundamentals.

Database Systems: Introducing the database and DBMS, Why the database is important, Historical Roots: Files and File Systems, Problems with File System Data Management, Database Systems, and DBMS architecture.

Data Models: The importance of Data models, Data Model basic building blocks, Business Rules, The evaluation of Data Models, levels of Data Abstraction.

UNIT - II: Data Modelling

Relational Database Model: A logical view of Data, Keys, Integrity Rules, Relational Set operators, the Data Dictionary and the system catalogue, Relationships within the Relational Database, Indexes, Codd's relational database rules.

Entity Relationship Model: The ER Model, Developing ER Diagram, Database Design Challenges: Conflicting Goals.

UNIT - III: Normalization & SQL

Normalization of database tables: Database Tables and Normalization, The need for Normalization, The Normalization Process, Improving the design, Surrogate key Considerations, High level Normal Forms, Normalization and database design, de-normalization.

Introduction to SQL: Data Definition Commands, Data Manipulation Commands, Select queries, Advanced Data Definition Commands, Advanced Select queries, Virtual tables, Joining Database Tables.

UNIT - IV: Advanced SQL & Procedural SQL

Advanced SQL: Relational Set Operators, SQL Join Operators, Sub-queries, SQL Functions, Oracle Sequences, Updatable Views,

PLSQL: programming statements, triggers, cursors, stored procedures, stored functions.

UNIT - V:

Transaction management, Database Administration, Distributed Databases
Transaction properties, transaction management with SQL, transaction log

Concurrency control: Lost updates, uncommitted data, and inconsistent retrievals.

Database Administration: The evolution of database administration function, database administrator roles and responsibilities, database security.

Distributed Database Management Systems: The evolution of distributed Database Management Systems, DDBMS advantages and Disadvantages, Distribution Processing and Distribution Databases, Characteristics of distributed Database management systems.

PRESCRIBED TEXT BOOK:

Database Systems Design, Implementation and Management by Peter Rob, Carlos Coronel, 7th Edition Cengage Learning.

REFERENCE BOOKS:

1. Database management Systems by Raghuramakrishnan & Johannes Gehrke McGrahill 3rd edition.
2. Fundamentals of Database Systems by Elmasri / Navathe, Seventh Edition, Person Addison Wesley.
3. An Introduction to Database Systems by C.J.Date, A.Kannan, S. Swamynathan, Eight Edition, Person Education.
4. Database system Concepts by Avi Silberschatz, Henry F.Korth S. Sudarshan McGraw-Hill Sixth edition.

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COURSE OBJECTIVES:

To enable the students to:

- To make students to create a Complete Web technology solution.
- Applying JavaScript validations.
- Understand use of MySQL and PHP in Web Technologies.

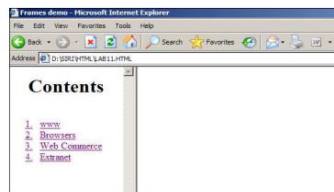
COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Evaluate interactive web pages using html and style sheets.
- Learn real time applications using event handling with validations.
- Acknowledge providing database connectivity to web applications with examples.
- Learn web page development and build web applications.

Exercises:

1. Write a HTML program illustrating text formatting.
2. Prepare a sample code to link different WebPages.
3. Prepare a sample code to navigate different sections, of the page using named anchors.
4. Create a simple HTML program. to illustrate three types of lists
5. Create a webpage containing your biodata (assume the form and fields).
6. Design a class Time -Table.
7. Divide the web page(frames) as follows and Create a linked web page:



8. Write a html program including style sheets.
9. Write a html program to demonstrate layers of information in web page.
10. Create a static webpage for college management.
11. Write a java Script for performing Arithmetic Operations.
12. Write a java Script to validate the Email address and mobile no of the user.
13. Write a PHP program to prepare the student marks list.
14. Write a PHP program for multiplication table
15. Write a PHP program for call by value
16. Write a PHP program for call by reference
17. Write a PHP script using string handling functions
18. Write a PHP program by using all array functions.
19. Write a PHP program for login form in PHP to get form data by using PHP super global \$_GET&
20. Write a PHP program for login form in PHP to get form data by using PHP super global \$_POST
21. Write a PHP application to add new Rows in a Table.
22. Write a PHP application to modify the Rows in a Table.
23. Write a PHP application to delete the Rows from a Table.
24. Write a PHP application to fetch the Rows in a Table.

COURSE OBJECTIVES:

To enable the students to:

- To make the learner efficiently work as software engineer.
- Design, implement, and evaluate software-based systems or programs of varying complexity that meet desired needs and constraints
- Demonstrate accepted design and development principles.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Describe basic concepts related to software engineering methods.
- Analyze the requirements for a given problem
- Apply the design paradigms to design simple software system
- Demonstrate the testing methods and their procedures to implement in any project.

UNIT – I: INTRODUCTION TO SOFTWARE ENGINEERING.

Definition of software and software engineering, characteristics of software, software myths.

Modeling with UML: - UML Concepts, diagrams.

SOFTWARE PROCESS: software process models - the waterfall model, incremental process model, prototyping model, spiral model, RAD model.

UNIT – II: SOFTWARE REQUIREMENT ANALYSIS

Requirements engineering, requirement elicitation for software, developing use cases, requirement validation, requirement specification.

Requirement analysis introduction, elements of the analysis model – data objects, attributes.

UNIT – III: SOFTWARE DESIGN:-

The software design process, design concepts, object – oriented design concepts . System design activities: - architectural design, user interface design, component level design, pattern based design.

UNIT – IV: SOFTWARE TESTING:

Software testing fundamentals, white box testing, black box testing Software testing strategies:- unit testing, integration testing, regression testing , smoke testing, validation testing, system testing, debugging.

UNIT – V: MANAGING CHANGE:

Project management concepts, process improvement, process and product quality, process analysis and modeling, process measurement, process classification, the CMMI process improvement frame work, software maintenance, s/w supportability, s/w reengineering, reverse engineering.

TEXT BOOK:-“Software engineering- a practitioners approach “ by roger s. pressman, MCGRAW HILL, 7th edition.

REFERENCE BOOK:- “Software engineering “by Ian sommersille, pearson education, 7th edition.
Software engineering – design reliability and management “by Richard Fairley.

COURSE OBJECTIVES:

To enable the students to:

- Study basics of data communication systems.
- Various types of transmission media
- Discuss about multiplexing techniques.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Understand basic concepts of data communication and layered architecture.
- Ability to understand different techniques in transmission media.
- Identify various Multiplexing and signal encoding techniques.

UNIT I

Introduction: A communication model – data communication – data communication networking.
Protocol Architecture: Need for protocol architecture – a simple protocol architecture – OSI – TCP/IP protocol architecture.

UNIT II

Data transmission: concepts and terminology – analog and digital data transmission – transmission impairments – Channel Capacity -- Transmission Media: Guided and Unguided.

UNIT III

Signal encoding techniques: Digital data digital signals – digital data analog signals – analog data digital signals– analog data analog signals.

UNIT IV

Digital Data Communication Techniques: Asynchronous and Synchronous transmission – types of errors - error detection techniques –error correction techniques – interfacing.

UNIT V

Multiplexing: Frequency division multiplexing – characteristics. Synchronous time division multiplexing – characteristics, TDM Link Control. Statistical time division multiplexing -- characteristics.

Text Books:

1. Data and computer communications, William Stallings, Pearson Education 7th Edn
2. Data Communications and Networking by Behrouz A Forouzan, PHI, 4th Edn.

Reference Books:

1. Data Communications, Computer Networks and Open systems by Fred Halsall, 4th edi., Pearson Education

COURSE OBJECTIVES:

To enable the students to:

- Understand the importance and basic concepts and of object oriented modeling.
- Describe the object-oriented approach to system development, modeling objects, relationships and interactions.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Analyze the problem and apply to real world problems.
- Analyze and design the requirements through use case driven approach.
- Analyze the case study and apply the UML notations.

UNIT-I

Introduction to UML: Importance of modeling, principles of modeling, Object oriented modeling, Conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT-II

Basic Structural Modeling: Classes, Relationships, Common Mechanisms, and Diagrams.
Advanced Structural Modeling: Advanced classes, Advanced relationships, Interfaces, Types and Roles, Packages.

UNIT-III

Class & Object Diagrams: Terms, Concepts, Modeling techniques for Class & Object Diagrams.
Basic Behavioral Modeling-I: Interactions, Interaction diagrams.

UNIT-IV

Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams. Advanced Behavioral Modeling: Events and signals, State machines, Processes and Threads, Time and space, State chart diagrams.

UNIT-V

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. Case Study: The Unified Library application.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

Reference Books:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, Wiley- Dreamtech India Pvt. Ltd.

COURSE OBJECTIVES:

The Software Engineering Lab has been developed by keeping in mind the following objectives:

- To impart state-of-the-art knowledge on Software Engineering and UML in an interactive manner.
- Present case studies to demonstrate practical applications of different concepts.

COURSE OUTCOMES:

- Can produce the requirements and use cases the client wants for the software being produced.
- Create and specify such a software design based on the requirement specification that the software can be implemented based on the design.

LIST OF PROGRAMS

1. Phases in software development project, overview, need, coverage of topics
2. To perform the system analysis : Requirement analysis, SRS
3. To draw UML diagrams using Microsoft Visio software.
4. To perform the user's view analysis : Use case diagram
5. To draw the structural view diagram : Class diagram, object diagram
6. To draw the behavioral view diagram : Sequence diagram, Collaboration diagram
7. To draw the behavioral view diagram : State-chart diagram, Activity diagram
8. To draw the implementation view diagram: Component diagram
9. To draw the environmental view diagram : Deployment diagram

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COURSE OBJECTIVES:

Modern scientific, engineering, and business applications are increasingly dependent on data, existing traditional data analysis technologies were not designed for the complexity of the modern world. Data Science has emerged as a new, exciting, and fast-paced discipline that explores novel statistical, algorithmic, and implementation challenges that emerge in processing, storing, and extracting knowledge from Big Data.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Understand and apply the fundamental concepts and techniques in data science
- Able to apply fundamental algorithmic ideas to process data.
- Document and transfer the results and effectively communicate the findings using visualization techniques.

UNIT I

INTRODUCTION TO DATA SCIENCE :Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – introduction to NoSQL.

UNIT II

MODELING METHODS :Choosing and evaluating models – mapping problems to machine learning, evaluating clustering models, validating models – cluster analysis – K-means algorithm, Naïve Bayes – Memorization Methods – Linear and logistic regression – unsupervised methods.

UNIT III

INTRODUCTION TO R Language:Reading and getting data into R – ordered and unordered factors – arrays and matrices – lists and data frames – reading data from files – probability distributions – statistical models in R - manipulating objects – data distribution.

UNIT IV

MAP REDUCE: Introduction – distributed file system – algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce – Hadoop - Understanding the Map Reduce architecture - Writing Hadoop Map Reduce Programs - Loading data into HDFS - Executing the Map phase - Shuffling and sorting - Reducing phase execution.

UNIT V

DELIVERING RESULTS :Documentation and deployment – producing effective presentations– Introduction to graphical analysis – plot() function – displaying multivariate data – matrix plots – multiple plots in one window - exporting graph - using graphics parameters. Case studies.

Reference Books

1. Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.
2. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.
3. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc., 2012.
4. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.
5. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, "Practical Data Science Cookbook", Packt Publishing Ltd., 2014.
6. Nathan Yau, "Visualize This: The FlowingData Guide to Design, Visualization, and Statistics", Wiley, 2011.
7. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.

Student Activity:

- 1. Collect data from any real time system and create clusters using any clustering algorithm**
- 2. Read the student exam data in R perform statistical analysis on data and print results.**

COURSE OBJECTIVES:

To enable the students to:

- Learn practical foundation level training that enables immediate and effective participation in big data projects.
- Understand basic and advanced methods to big data technology and tools, including MapReduce and Hadoop and its ecosystem.

COURSE OUTCOMES

After Completion of this course the student would be able to:

- Learn tips and tricks for Big Data use cases and solutions.
- Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop.
- Able to apply Hadoop ecosystem components.

UNIT I

INTRODUCTION TO BIG DATA: Introduction – distributed file system – Big Data and its importance, Four V's in bigdata, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

UNIT II

INTRODUCTION HADOOP : Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

UNIT- III

HADOOP ARCHITECTURE: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Tasktrackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

UNIT-IV

HADOOP ECOSYSTEM AND YARN : Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features- NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

UNIT-V

HIVE AND HIVEQL, HBASE:-Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase concepts- Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

Reference Books

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012.
3. Tom White, "HADOOP: The definitive Guide" , O Reilly 2012.
4. Vignesh Prajapati, "Big Data Analytics with R and Haoop", Packet Publishing 2013.
5. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.
6. Jy Liebowitz, "Big Data and Business analytics",CRC press, 2013.

Student Activity:

1. Collect real time data and justify how it has become Big Data
2. Reduce the dimensionality of a big data using your own map reducer

COURSE OBJECTIVES:

To enable the students to:

Learn fundamental concepts and tools needed to understand the emerging role of business analytics in Organizations.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

1. Learn the Big Data in Technology Perspective.
2. Understanding of the statistical procedures most often used by practicing engineers
3. Understand Forecasting methods and apply for business applications.

UNIT – I

DATA ANALYTICS LIFE CYCLE: Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists - Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.

UNIT – II

STATISTICS Sampling Techniques:

Data classification, Tabulation, Frequency and Graphic representation - Measures of central value - Arithmetic mean, Geometric mean, Harmonic mean, Mode, Median, Quartiles, Deciles, Percentile - Measures of variation – Range, IQR, Quartile deviation, Mean deviation, standard deviation, coefficient variance, skewness, Moments & Kurtosis.

UNIT – III

PROBABILITY AND HYPOTHESIS TESTING:

Random variable, distributions, two dimensional R.V, joint probability function, marginal density function. Random vectors - Some special probability distribution - Binomial, Poisson, Geometric, uniform, exponential, normal, gamma and Erlang. Multivariate normal distribution - Sampling distribution – Estimation - point, confidence – Test of significance, 1& 2 tailed test, uses of t-distribution, F-distribution, χ^2 distribution.

UNIT – IV

PREDICTIVE ANALYTICS:

Predictive modeling and Analysis - Regression Analysis, Multicollinearity, Correlation analysis, Rank correlation coefficient, Multiple correlation, Least square, Curve fitting and goodness of fit.

UNIT – V

TIME SERIES FORECASTING AND DESIGN OF EXPERIMENTS :Forecasting Models for Time series : MA, SES, TS with trend, season - Design of Experiments, one way classification, two way classification, ANOVA, Latin square, Factorial Design.

Reference Books

1. Chris Eaton, Dirk Deroos, Tom Deutsch et al., "Understanding Big Data", McGrawHill, 2012.
2. Alberto Cordoba, "Understanding the Predictive Analytics Lifecycle", Wiley, 2014.

3. Eric Siegel, Thomas H. Davenport , “Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die”, Wiley, 2013.
4. James R Evans, “Business Analytics – Methods, Models and Decisions”, Pearson 2013.
5. R. N. Prasad, Seema Acharya, “Fundamentals of Business Analytics”, Wiley, 2015.
6. S M Ross, “Introduction to Probability and Statistics for Engineers and Scientists”, Academic Foundation, 2011.
7. David Hand, Heiki Mannila, Padhria Smyth, “Principles of Data Mining”, PHI 2013.
8. Spyros Makridakis, Steven C Wheelwright, Rob J Hyndman, “Forecasting methods and applications”, Wiley 2013(Reprint).

Student Activity:

- 1. Collect temperatures of previous months and prepare a logic to estimate the temperature of next one week**
- 2. Collect real time data and apply statistical techniques to classify it.**

COURSE OBJECTIVES:

To enable the students :

- To expose the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.
- To discuss multiple levels of distributed algorithms, distributed file systems, distributed databases, security and protection.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Create models for distributed systems.
- Apply different techniques learned in the distributed system like file system and hence enhance employability skills.

UNIT I

Introduction to Distributed Computing Systems, System Models, and Issues in Designing a Distributed Operating System, Examples of distributed systems.

UNIT II

Features of Message Passing System, Synchronization and Buffering, Introduction to RPC and its models, Transparency of RPC, Implementation Mechanism, Stub Generation and RPC Messages, Server Management, Call Semantics, Communication Protocols and Client Server Binding.

UNIT III

Introduction, Design and implementation of DSM system, Granularity and Consistency Model, Advantages of DSM, Clock Synchronization, Event Ordering, Mutual exclusion, Deadlock, Election Algorithms.

UNIT IV

Task Assignment Approach, Load Balancing Approach, Load Sharing Approach, Process Migration and Threads.

UNIT V

File Models, File Accessing Models, File Sharing Semantics, File Caching Schemes, File Replication, Atomic Transactions, Cryptography, Authentication, Access control and Digital Signatures.

Reference Books

1. Pradeep. K. Sinha: " Distributed Operating Systems: Concepts and Design " , PHI, 2007.
- 2 .George Coulouris, Jean Dollimore, Tim Kindberg: " Distributed Systems" , Concept and Design, 3rd Edition, Pearson Education, 2005.

Student Activity

1. Implementation of Distributed Mutual Exclusion Algorithm.
2. Create a Distributed Simulation Environment.

COURSE OBJECTIVES:

To enable the students to:

- Motivate them to work in emerging/latest technologies.
- To develop ability, apply theoretical and practical tools/techniques.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Understand the software development process, models and software engineering principles
- Plan, analyze, design and implement a software project using programming languages like C, Java, PHP etc.
- Gain the confidence.

The objective of the project is to motivate them to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

The project is of 2 hours/week for one (semester VI) semester duration and a student is expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides.

The project proposal should include the following:

- Title
- Objectives
- Input and output
- Details of modules and process logic
- Limitations of the project
- Tools/platforms, Languages to be used
- Scope of future application

The Project work should be either an individual one or a group of not more than three members and submit a project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voce examinations.

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- Scope of future application

The Project work should be either an individual one or a group of not more than three members and submit a project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voce examinations.

COURSE OBJECTIVES:

To enable the students to:

- Learn to perform data mining tasks using WEKA tool.
- Understand the data sets and data preprocessing.
- Demonstrate the working of algorithms for data mining tasks such association rule mining, classification and clustering.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Demonstrate the association rule mining, classification and clustering in large data sets.
- Ability to apply mining techniques for realistic data.

1. Introduction about Weka Tool.
2. Converting Numerical attribute to Nominal attributes.
3. Demonstration of preprocessing on dataset Weather.arff
4. Demonstration of Association rule process on dataset Student.arff using Apriori algorithm.
5. Demonstration of Association rule process on dataset Test.arff using Apriori algorithm.
6. Demonstration of classification rule process on dataset student.arff using j48 algorithm.
7. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm.
8. Demonstration of clustering rule process on dataset weather.arff using simple k-means.
9. Demonstration of clustering rule process on dataset student.arff using simple k-means.

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COURSE OBJECTIVES:

- Learn various cloud service models.
- Understand the concept of Virtualization.
- import fundamental concepts in the area of cloud computing

COURSE OUTCOMES

- Compare the strengths and limitations of cloud computing
- Identify the architecture, infrastructure of cloud computing
- Apply suitable virtualization concept.
- Address the core issues related to Security concerns.

UNIT-I: CLOUD COMPUTING OVERVIEW:

Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service , Broad network access , Location independent resource pooling , Rapid elasticity , Measured service.

UNIT-II: Cloud scenarios – Benefits:

Scalability, simplicity, vendors, security. Limitations – Sensitive information - Application development – Security concerns - privacy concern with a third party - security level of third party - security benefits Regularity issues: Government policies.

UNIT – III: Cloud architecture:

Cloud delivery model – SPI framework, SPI evolution , SPI vs. traditional IT Model

Software as a Service (SaaS): SaaS service providers – Google App Engine, Salesforce.com and google platform – Benefits – Operational benefits - Economic benefits – Evaluating SaaS

Platform as a Service (PaaS): PaaS service providers – Right Scale – Salesforce.com – Rackspace – Force.com – Services and Benefits

UNIT – IV: Infrastructure as a Service

(IaaS): IaaS service providers – Amazon EC2 , GoGrid –Microsoft soft implementation and support – Amazon EC service level agreement – Recent developments – Benefits

Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing

UNIT – V: Virtualization:

Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations.

Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization.

Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization–Network virtualization.

Microsoft Implementation: Microsoft Hyper V – Vmware features and infrastructure – Virtual Box - Thin client.

REFERENCE BOOKS:

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter TATA McGraw- Hill , New Delhi - 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
3. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
4. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madiseti, University Press
5. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christenvecctiola, S Tammarai selvi, TMH

STUDENT ACTIVITY:

1. Prepare the list of companies providing cloud services category wise.
2. Create a private cloud using local server

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COURSE OBJECTIVES:

To enable the students to:

- Understand the overall architecture of a data warehouse and techniques.
- Learn Different data mining models and techniques.
- Various algorithms in Association rule mining, classification and clustering.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Understand operational database, warehousing and multidimensional need of database to meet industrial needs.
- Ability to apply acquired knowledge for understanding data and select suitable methods for data analysis.
- Technically know how to apply Data Mining principles and techniques for real time applications.

UNIT – I: DATA WAREHOUSING : Data warehousing Components –Building a Data warehouse– Data Extraction, Cleanup, and Transformation Tools –Metadata.

UNIT – II: Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation.

UNIT – III: Introduction To Data Mining: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining.

Data Pre-Processing: Needs Pre-processing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT – IV: ASSOCIATION RULE MINING AND CLASSIFICATION: Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis Classification- Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Associative Classification.

UNIT – V: CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING :

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods - K-means – Partitioning Methods – Hierarchical Methods - Density-Based Methods - Clustering High Dimensional Data- Outlier Analysis.

TEXT BOOKS:

1. Data Mining Concepts and Techniques Jiawei Han and Micheline Kamber Morgan Kaufman Publications.

REFERENCE BOOKS:

1. Data Mining Introductory and Advanced Topics, Margaret H Dunhan, Pearson Education.
2. Data Mining, Ian H. Witten Eibe Frank, Morgan Kaufman Publications.

COURSE OBJECTIVES:

To enable the students to:

- Understand the concepts of computer networks.
- Study the functions of different layers.
- Make the students to get familiarized with different protocols and network components.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Enumerate the layers of the OSI model and TCP/IP.
- Knows about different topologies, network types and IEEE standards.
- Understand and build the skills of routing mechanisms.
- Familiarity with the basic protocols of computer networks.

UNIT-I: INTRODUCTION:

Uses of Computer Networks – Networks for Companies, Networks for people, Social Issues. Network Hardware – Topologies, LAN, MAN, WAN, Wireless Networks, Internetworks. Network Software– Protocol Hierarchies, Design Issues for the Layers, Interfaces and Services, Connection-Oriented and Connectionless Services, Service Primitives.

Reference Models -The OSI Reference Model, The TCP/IP Reference Model, A comparison of the OSI and TCP Reference Model.

Physical Layer: Transmission Media – Magnetic media, Twisted Pair, Baseband Coaxial Cable, Broadband Coaxial Cable, Fiber Optics, Wireless Transmission.

Chapters 1.1, 1.2, 1.3, 1.4(1.4.1, 1.4.2, 1.4.3), 2.2, 2.3

UNIT-II: DATA LINK LAYER: Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols- A Simplex Stop-and-Wait Protocol, A Simplex Protocol for a Noisy channel. Sliding Window Protocol- A protocol using Go Back n

UNIT-III: MEDIUM ACCESS SUBLAYER:

Channel Allocation Problem, Multiple Access Protocols, IEEE Standard 802.3: Ethernet, 802.5: Token Ring

Chapters: 3.1, 3.2, 3.3(3.3.2, 3.3.3), 3.4(3.4.1, 3.4.2), 4.1, 4.2, 4.3(4.3.1, 4.3.3)

UNIT-IV: NETWORK LAYER:

Network Layer Design Issues, Routing Algorithms-Shortest Path Routing, Hierarchical Routing, Routing for Mobile Hosts, Broadcast Routing and Multicast Routing.

Chapters: 5.1, 5.2(5.2.1, 5.2.2, 5.2.7, 5.2.8, 5.2.9, 5.2.10)

UNIT-V: TRANSPORT LAYER:

The Transport Services-Services provided to the Upper Layers, Quality of Service, Transport Service Primitives, Elements of Transport Protocols-Addressing, Establishing a connection, Releasing a connection, Flow control and buffering, Multiplexing, and Crash Recovery.

Chapters: 6.1, 6.2

APPLICATION LAYER: Domain Name System, Simple Network Management Protocol- SNMP Model, SNMP Protocol, Electronic Mail, and World Wide Web.

Chapters: 7.2, 7.3(7.3.1, 7.3.5), 7.4(7.4.1, 7.4.2, 7.4.3), 7.6(7.6.1, 7.6.2, 7.6.3)

TEXT BOOK: Andrew S. Tanenbaum, "Computer networks", Third Edition, Pearson Education.

REFERENCE BOOK: Behrouz A. Fourouzan, "Data Communication and Networking", Tata

McGraw- Hill, 2004.

COURSE OBJECTIVES:

To enable the students to:

- Motivate them to work in emerging/latest technologies.
- To develop ability, apply theoretical and practical tools/techniques.

COURSE OUTCOMES:

Upon successful completion of the course, a student will be able to:

- Understand the software development process, models and software engineering principles
- Plan, analyze, design and implement a software project using programming languages like C, Java, PHP etc.
- Gain the confidence.

The objective of the project is to motivate them to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

The project is of 2 hours/week for one (semester VI) semester duration and a student is expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides.

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- Title
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- Input and output
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- Limitations of the project
- Tools/platforms, Languages to be used
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The Project work should be either an individual one or a group of not more than three members and submit a project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voce examinations.

COURSE OBJECTIVES:

To enable the students to:

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- Tools/platforms, Languages to be used
- Scope of future application

The Project work should be either an individual one or a group of not more than three members and submit a project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voce examinations.

COURSE OBJECTIVES:

- Analyze the different layers in networks.
 - Define, use, and differentiate such concepts as OSI-ISO, TCP/IP.
 - Build an understanding of the fundamental concepts of computer networking.
 - To be familiar with contemporary issues in networking technologies.
 - Allow the student to gain expertise in maintenance of individual networks.
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1. Study of different types of Network Cables.
 2. Study of different Network Devices in detail.
 3. Study of network IP
 4. Connect the computers in local area network.
 5. To study various types of connectors
 6. To Develop and implement a HTTP server
 7. Gives the server name, username and password, retrieve the mails and allow manipulation of mailbox using POP commands.

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Course Objectives:

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

Course Outcomes:

Upon Successful Completion of the course, a student will be able to:

- Describe network security services and mechanisms.
- Symmetrical and Asymmetrical cryptography.
- Data integrity, Authentication, Digital Signatures.
- Various network security applications, IPsec, Firewall, IDS, Web security, Email security, and Malicious software etc.

UNIT I: INTRODUCTION

Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – crypt analysis.

UNIT II :SYMMETRIC KEY CRYPTOGRAPHY

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures – Modular arithmetic-Euclid's algorithm- Congruence and matrices – Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: DES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard – RC4 – Key distribution.

UNIT III: PUBLIC KEY CRYPTOGRAPHY

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem – Chinese Remainder Theorem – Exponentiation and logarithm – ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange – ElGamal cryptosystem – Elliptic curve arithmetic- Elliptic curve cryptography.

UNIT IV: MESSAGE AUTHENTICATION AND INTEGRITY

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA – Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications – Kerberos, X.509

UNIT V: SECURITY PRACTICE AND SYSTEM SECURITY

Electronic Mail security – PGP, S/MIME – IP security – Web Security – SYSTEM SECURITY: Intruders – Malicious software – viruses – Firewalls.

TEXT BOOK: William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

Course Objectives:

- To learn computer forensics
- To become familiar with forensics tools
- To learn to analyze and validate forensics data

Course Outcomes:

Upon Successful Completion of the course, a student will be able to:

- Understand the basics of computer forensics
- Apply a number of different computer forensic tools to a given scenario
- Analyze and validate forensics data
- Identify the vulnerabilities in a given network infrastructure
- Implement real-world hacking techniques to test system security

UNIT I: INTRODUCTION TO COMPUTER FORENSICS

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques – Incident and incident response methodology – Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. – Forensics Technology and Systems – Understanding Computer Investigation – Data Acquisition.

UNIT II: EVIDENCE COLLECTION AND FORENSIC TOOLS

Processing Crime and Incident Scenes – Working with Windows and DOS Systems.
Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT III : ANALYSIS AND VALIDATION

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

UNIT IV: ETHICAL HACKING

Introduction to Ethical Hacking – Footprinting and Reconnaissance – Scanning Networks – Enumeration – System Hacking – Malware Threats – Sniffing

UNIT V: ETHICAL HACKING IN WEB

Social Engineering – Denial of Service – Session Hijacking – Hacking Web servers – Hacking Web Applications – SQL Injection – Hacking Wireless Networks – Hacking Mobile Platforms.

TEXT BOOKS:

Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, –Computer Forensics and Investigations, Cengage Learning, India Edition, 2016.

CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.