

INT322:COMPUTING SYSTEM AND TECHNOLOGIES

L:2 T:0 P:2 Credits:3

Course Outcomes: Through this course students should be able to

CO1 :: define the asymptotic notations (Big-O, Big-omega, Big-Theta) used to determine the efficiency of algorithms.

CO2 :: explain the importance of Stack and Queue in solving real-world problems.

CO3 :: apply Linked List data structures to solve computational problems.

CO4 :: analyze database architecture and the mechanisms used to control access to data.

CO5 :: evaluate queries and integrity constraints enforced on a relational database.

CO6 :: design transactions in a relational database based on their properties and states.

Unit I

Foundational Concepts : Introduction to C/C++, Data types, variables, constants, Reading and writing data using (scanf, printf, cin and cout), Control structures (if-else, loops), Functions (declaration, definition, call by value and reference), recursion, Introduction to OOPs, User-defined data types (struct, class), classes and objects, Manager Functions (constructors and destructors).

Introduction to data structure and algorithms : Introduction to data structures and types of data structures, complexity analysis (time and space), time-space trade off, complexity notations i.e. Big-O, Big-Omega, and Big-Theta

Unit II

Introduction to Array Concepts : Definition and Initialization of Arrays, memory representation of 1-D arrays, operations on 1-D array (traversal, insertion and deletion, searching- linear and binary, sorting-bubble sort) and their complexity analysis.

Stacks and Queues : Definition and operations on stack, Implementation of Stack Operations (traversal, push and pop), Conditions for Underflow and Overflow of Stack, Definition and operations on Queue, Implementation of Queue operations(traversal, ENQ and DEQ), Conditions for Underflow and Overflow of Queue.

Unit III

Introduction to Linked Lists : Definition of linked list, Implementation of Singly Linked List, Operations on Singly Linked List linked list (traversal, insertion and deletion), Conditions for Underflow and Overflow

Introduction to Trees : Introduction to Trees, Tree Terminology (Root,Edge,Parent,Child,Siblings,Leaf,Degree,Level,Height,Depth,Path,Subtree) Conceptual understanding of Binary trees and Binary Search Trees, Implementation of Binary Tree Traversal (Preorder,Inorder,Postorder)

Unit IV

Introduction to Database Management System(DBMS) : Conceptual understanding of Databases, DBMS Applications, Components of DBMS, Users/Actors of DBMS, DBMS Architecture, Data Independence and its types

Unit V

Introduction to SQL : Introduction to SQL, Types of SQL Commands(DDL,DML,DCL,TCL), Keys and its types, Aggregate Functions(Min,Max,Sum,Avg,Count), Joins(Self,Equi,Inner,Outer,Cross), Group by and Having Clause, Order by Clause.

Unit VI

Database design : Types of Dependencies(Functional, Fully Functional, Transitive), Concept of Normalization, Types of Normal Forms(1NF,2NF,3NF)

Transaction processing : Introduction to Transaction, Read/Write Operations on Transactions, States/Stages of a Transaction, ACID Properties of a Transaction, Introduction to PL/SQL Block structure, Implementation of Operators and Control Statements in PL/SQL, Implementation of Procedures and Functions in PL/SQL

List of Practicals / Experiments:

List of Practical

- 1)Programs to explore usage of Data types, Operators and their usage.

- 2)Programs on decision making constructs as if, if else, ladder if, nested if
- 3)Programs on looping like while, for, do-while loops
- 4)Program to explore different prototypes/functions.
- 5)Program to differentiate between call by value, call by reference.
- 6)Program to explore concept of Classes/Structure .
- 7)Program to identify usage of Constructors and Desctructors.
- 8)Program on initialization and traversing of an array(1D)
- 9)Program on insertion of an element to array(1D)
- 10)Program on deletion of an element to an array(1D)
- 11)Program on searching element from an array using linear search(1D)
- 12)Program on searching element of an array using binary search(1D)
- 13)Program on sorting elements of array using Bubble sort(1D)
- 14)Program on push operation on stacks
- 15)Program on Pop operation on stacks
- 16)Program on ENQ operation on queue
- 17)Program on DEQ operation on queue
- 18)Program on creating a node in linked list
- 19)Program on traversing nodes in linked list
- 20)Create tables using DDL commands.
- 21)Alter/ Delete tables using DDL commands
- 22)Perform INSERT, UPDATE and DELETE operations using DML commands.
- 23)Retrieve data using SELECT with WHERE clause.
- 24)Demonstrate all Aggregate Functions.
- 25)Perform ORDER BY, GROUP BY and HAVING operations.
- 26)Implement all types of Joins.
- 27)Create Primary Key, Foreign Key, Unique Key and Composite Key
- 28)Create and execute transactions using COMMIT, ROLLBACK and SAVEPOINT
- 29)Create and destroy users access using DCL commands.
- 30)Write PL/SQL blocks using operators and control statements.
- 31)Implement IF-ELSE and LOOP statements in PL/SQL.
- 32)Create Procedures in PL/SQL.
- 33)Create Functions in PL/SQL.

Text Books:

1. SQL, PL/SQL THE PROGRAMMING LANGUAGE OF ORACLE by IVAN BAYROSS, BPB PUBLICATIONS
2. DATA STRUCTURES by SEYMOUR LIPSCHUTZ, Tata McGraw Hill, India
3. OBJECT-ORIENTED PROGRAMMING WITH C++ by E. BALAGURUSAMY, Tata McGraw Hill, India
4. PROGRAMMING IN ANSI C by E. BALAGURUSAMY ·, Tata McGraw Hill, India

References:

1. DATA STRUCTURES AND ALGORITHMS by ALFRED. V.AHO, PEARSON
2. DATABASE SYSTEMS: MODELS, LANGUAGES, DESIGN AND APPLICATION PROGRAMMING by RAMEZ ELMASRI, SHAMKANT B. NAVATHE, PEARSON, PEARSON

