Data structure using C++ (CMP505)

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Course Name : Data Structure using C++
Course No : CMP505

Course Details :

Unit 1. Introduction to Data Structure :

Basic Terminology

a. Elementary data structure organization
b. Classification of data structure

Operations on data structures

a. Traversing, Inserting, deleting
b. Searching, sorting, merging

Different Approaches to designing an algorithm

a. Top-Down approach
b. Bottom-up approach

Complexity

a. Time complexity
b. Space complexity

Asymptotic Notations

a. O Notation
b. Ω Notation
c. θ Notation

Unit 2. Sorting and Searching :

Sorting Techniques

a. Introduction
b. Selection sort
c. Insertion sort
d. Bubble sort
e. Merge sort
f. Radix sort (Only algorithm)
g. Shell sort (Only algorithm)
h. Quick sort (Only algorithm)

Searching

a. Linear search
b. Binary search

Unit 3. Stacks :

Introduction to stack

a. Stack as an abstract data type

b. Representation of stack through arrays

Applications of Stack

a. Reversing a list

b. Polish notations

c. Conversion of infix to postfix expression

d. Evaluation of postfix expression

e. Converting an infix into prefix expression

f. Evaluation of prefix expression

g. Recursion

Unit 4. Queues :

Introduction

a. Queues as an abstract data type

b. Representation of a Queue as an array

Types of Queue

a. Circular Queue

b. Double Ended Queue

c. Priority Queue

d. Dequeues

Applications of Queue

Unit 5. Linked List :

Introduction

a. Terminologies: node, Address, Pointer,

b. Information, Next, Null Pointer, Empty list etc.

Type of lists

a. Linear list

b. Circular list

c. Doubly list

Operations on a singly linked list (only algorithm)

a. Traversing a singly linked list

b. Searching a linked list

c. Inserting a new node in a linked list

d. Deleting a node from a linked list

Unit 6. Trees :

Introduction

a. Terminologies: tree ,degree of a node, degree of a tree, level of a node, leaf node, Depth / Height of a tree, In -degree & out -Degree, Directed edge, Path, Ancestor & descendant nodes.

Tree Types and Traversal Methods

b. Type of Trees

c. General tree

d. Binary tree

e. Binary search tree (BST).

Binary tree traversal (only algorithm)

a. In order traversal

b. Pre order traversal

c. Post order traversal

Expression tree

Unit 7. Graph :

Introduction

a. Terminologies: graph, node (Vertices), arcs (edge), directed graph, in -degree, out -degree, adjacent, successor, predecessor, relation, weight, path, length.

Representations of a graph

a. Array Representation

b. Linked list Representation

Traversal of graphs

a. Depth-first search (DFS).

b. Breadth-first search (BFS).

Applications of Graph

Unit 8. Hashing :

Hash function

Collision resolution techniques