

DATA STRUCTURES FOR ENGINEERING APPLICATIONS

Course Code: 15IT1111

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Course Outcomes:

At the end of the course, a student will be able to

CO 1 Choose searching algorithms.

CO 2 Develop programs for sorting and stacks.

CO 3 Explain concepts of queues.

CO 4 Outline concepts of linked lists.

CO 5 Interpret concepts of trees.

UNIT-I

(10Lectures)

RECURSION AND LINEAR SEARCH:

Preliminaries of algorithm, Algorithm analysis and complexity, Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi.

SEARCHING TECHNIQUES:

Introduction, Linear Search, Transpose Sequential Search, Interpolation Search, Binary Search, Fibonacci Search.

UNIT-II

(10Lectures)

SORTING TECHNIQUES:

Basic concepts, insertion sort, selection sort, bubble sort, quick sort, merge sort.

STACKS:

Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, In-fix to postfix Transformation, Evaluating Arithmetic Expressions.

UNIT-III**(10Lectures)****QUEUES:**

Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack.

APPLICATIONS OF QUEUES:

Applications of Queues- Enqueue, Dequeue, Circular Queues, Priority Queues.

UNIT-IV**(10Lectures)****LINKED LISTS:**

Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, merging two single linked lists into one list, Reversing a single linked list, Circular linked list, Double linked list.

UNIT-V**(10Lectures)****TREES:**

Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in-order and pre(post)order traversals.

TEXTBOOKS:

1. Richard F. Gilberg & Behrouz A. Forouzan, “*Data Structures*”, 2nd Edition, Thomson, 2007.
2. G.A.V PAI, “*Data Structures and Algorithms*”, 1st Edition, Tata McGraw-Hill,2010.

REFERENCES:

1. Seymour Lipschutz ,”*Datat structures with C*”, 1st Edition, TMH, 2009.
2. Debasis Samanta, “*Classic Data Structures*”, 2nd Edition, PHI 2009.
3. Horowitz, Sahni, Anderson, *Fundamentals of Data Structures in C*, 2nd Edition, University Press, 2009.

Note: A small application may be implemented in software from their respective disciplines at the end of the course.