DATA STRUCTURES

(JOB ORIENTED ELECTIVE-I for Non-CSE/IT)

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Course Code: 20IT11Q2

Prerequisite: Programming for Problem Solving Lab using C

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

CO1: Classify different Searching and Sorting Algorithms.(L2)

CO2: Apply the concepts of using stacks and queues for various applications.(L3)

CO3: Apply the concepts of linked lists.(L3)

CO4: Interpret the concepts of Trees.(L2)

CO5: Explain the concepts of Graphs.(L2)

UNIT-I **(10 Lectures)**

SEARCHING TECHNIQUES:

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

SORTING TECHNIQUES:

Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.

Learning Outcomes: At the end of the module, student will be able to

1. illustrate how different searchings would work with examples. (L2)
2. describe insertion, selection, and bubble sort. (L2)
3. explain Merge Sort, Quick sort with example. (L2)

UNIT-II **(10 Lectures)**

LINEAR DATA STRUCTURES AND APPLICATIONS:

ABSTRACT DATA TYPES: Introduction, List ADT, Stack ADT, Queue ADT.

STACK- Definition, Basic Stack Operations, Implementation using Arrays, Applications- Recursion.

QUEUE- Definition, Basic Queue Operations, Implementation using Arrays, Applications, Circular Queues and Priority Queue.

Learning Outcomes: At the end of the module, student will be able to

1. explain the need of Linear Data Structures and their Applications. (L2)
2. implementation of stack and Queue data structure. (L3)
3. describe the advantages of circular, priority queue. (L2)

UNIT-III **(10 Lectures)**

LINKED LISTS:

Dynamic Memory Allocation, Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists .

Learning Outcomes: At the end of the module, student will be able to

1. Illustrate various functions to allocate memory dynamically. (L2)
2. demonstrate how to declare structures to be used in simple linked lists, doubly linked lists and circular linked lists. (L3)
3. write algorithms for inserting, deleting, and searching in a simple linked list. (L3)

UNIT-IV **(10 Lectures)**

NON-LINEAR DATA STRUCTURES – TREES:

Trees, Tree Terminology, Binary Trees, Binary Tree Travels, operations on Binary trees, Binary Search Trees and its operations , Creation of binary tree from in-order and pre(post)order traversals, applications of binary trees.

Learning Outcomes: At the end of the module, student will be able to

1. explain the need of Non-Linear Data Structures and their Applications. (L2)
2. describe various terminologies related to trees. (L2)
3. compare different types of trees and their applications. (L2)

UNIT-V **(10 Lectures)**

NON-LINEAR DATA STRUCTURES – GRAPHS

Graph, Graph Terminology, Graph Traversals- Breadth First Traversals, Depth First traversals, Minimal Spanning Trees.

Learning Outcomes: At the end of the module, student will be able to

1. describe various terminologies related to Graphs. (L2)
2. explain Graph Traversals techniques (L2)
3. discuss Prim's algorithm for finding the minimal spanning tree of a graph. (L2)

Text Books:

1. Reema Thareja, "*Data Structures Using C*", 2nd edition, Oxford Publication, 2014
2. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, "*Fundamentals of Data structures in C++"*, 2nd Edition, University Press (India) Pvt.Ltd.,2008.

References:

1. Richard G. Gilberg & Behrouz A. Forouzan, "*Data Structures*", 2nd Edition, Thomson, 2007.
2. Seymour Lipschutz, "*Data Structures with C*", 1st Edition, PHI, 2009.
3. Debasis Samanta, "*Classic Data Structures"*, 2nd Edition, PHI, 2009 .
4. G.A.V.PAI, "*Data Structures and Algorithms"*, 1st Edition, TataMcGraw Hill, 2010.

Web References:

1. https://nptel.ac.in/courses/106102064/
2. https://www.cs.usfca.edu/~galles/visualization/Algorithms.html