

RAMAKRISHNA MISSION VIDYAMANDIRA

NEP Syllabus of B.Sc. in Computer Science

Semester-II

Course Code: 2CMSCOC1

Course Type: Major Course

Course Outcome:

- i) Interpret and compute asymptotic notations of an algorithm to analyze the consumption of resources (time/space).
- ii) Exemplify and implement stack, queue and list ADT to manage the memory using static and dynamic allocations.
- iii) Develop and compare the comparison-based search algorithms and sorting algorithms.
- iv) Identify appropriate data structure and algorithm for a given contextual problem and develop in C.

2CMSCOC1: Data Structure

Credit: 3

Marks: 50

Arrays: Types, Memory Representation, Address Translation of single and multi-dimensional arrays with examples, Sparse Matrix: Triplet array representation. [4 L]

Linked Structures: Singly and doubly linked list (non-circular and circular). [4 L]

Stacks and Queues: Definition, Representation, Uses and Applications, Infix, Prefix & Postfix notations, Infix to postfix: conversion and evaluation, Circular Queue. [6 L]

Searching: Linear Search, Binary Search and Interpolation Search (Algorithm: Recursive, Non-Recursive and Performance Evaluation). [4 L]

Sorting: Terminology: Stability, Inversion; Algorithm: Recursive, Non-Recursive and Performance Evaluation. Bubble, Insertion, Selection, Quick sort, Merge Sort, Count Sort, Radix Sort. [7 L]

Trees : Binary Tree- Traversal (Inorder, Preorder, Postorder), Searching (DFS, BFS), [4 L]

Search Tree: Binary Search Tree- Insertion, Deletion, Searching; Height Balanced Tree (No algorithm required); Multiway tree: Introduction to B Tree and B+ Tree (No algorithm required). [7 L]

Applications of tree: Heap- Insertion, Deletion and Sorting. Huffman Encoding (only static), Red-Black tree (Definition and Construction). [4 L]

Hashing: Definition, Hash functions: Properties and Standard Hash functions. Collision: Definition and Resolution Techniques – Probing (Linear and Quadratic) and Chaining (Linear and Coalesced). Idea of Universal Hashing. [5 L]

2CMSCOC1: Data Structure Laboratory

Credit: 1

Marks: 25

Implementation of applications and problems related to course 2CMSCOC1 using C. [30 L]

Recommended Books:

1. Data Structure Using C and C++ by Tenenbaum, Langsam, Augenstein, 2nd Edition, Pearson.
 2. Data Structure and Program Design in C by Robert Kruse, C.L. Tondo; Pearson.
 3. Fundamentals of Data Structure in C by Ellis Horowitz, Sartaz Sahani; Galgotia.
 4. Algorithms in C (Vol 1 to 4) by Robert Sedgewick.
 5. <https://www.amazon.in/Data-Structures-Through-C-Language/dp/8176563757>
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