RAMAKRISHNA MISSION VIDYAMANDIRA

CBCS Syllabus B.Sc. Computer Science Honours

Semester-II

Course Code: CMSA CC 3 Credit: 6
Course Type: Core 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.

CMSA CC 3 T: Data Structure

Credit: 4   **Marks: 50**

Arrays: Types, Memory Representation, Address Translation and Functions of single and multi-dimensional arrays with examples, Sparse Matrix: Triplet array representation.   [6 L]

Linked Structures: Singly and doubly linked list (non-circular and circular).   [6 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).   [6 L]

Sorting: Terminology: Stability, Inversion; Algorithm: Recursive, Non Recursive and Performance Evaluation. Bubble, Insertion, Selection, Quick sort, Merge Sort, Count Sort, Radix Sort.   [10 L]

Trees : Binary Tree- Traversal (Inorder, Preorder, Postorder), Searching (DFS, BFS),   [6 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).   [8 L]

Applications of tree: Heap- Insertion, Deletion and Sorting. Huffman Encoding (only static), Red & Black tree (Definition and Construction).   [6 L]

Hashing: Definition, Hash functions: Properties and Standards Hash functions. Collision: Definition and Resolution Techniques – Probing (Linear and Quadratic) and Chaining (Linear and Coalesced). Idea of Universal Hashing. [6 L]

CMSA CC 3 P: Data Structure Laboratory

Credit: 2   **Marks: 25**

Implementation of applications and problems related to course CMSA CC 3 T using C.   [40 L]

Recommended Books:

1. Data Structure Using C and C++ by Tanenbaum, Langsam, Auguestein, 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.