DATA STRUCTURE & ALGORITHM EE-504A Credit: 3 Contact: 3L

Module 1

Introduction:

Importance of study of Data structure, Concept of data structure: Data and data structure, Abstract data type and data type. Algorithm and programs, Basic idea of pseudo-code, Algorithm efficiency and analysis, time and space analysis of algorithms-order notations.

Different representation: row major, column major.

Sparse matrix, its implementation and usage. Array representation of polynomials.

Singly linked list, circular linked list, doubly linked list, linked list representation of polynomial and applications. [08]

Module 2

Stack & queue:

Stack and its implementation, (using array, using linked list) application.

Queues, circular queue, dequeue, Implementation of queue- both linear and circular (using array, using linked list) applications.

Recursion: Principle of recursion- use of stack, difference between recursion and iteration, tail recursion. Application-The Tower of Hanoi, Eight Queen Puzzle. [07]

Module 3

Nonlinear data structure:

Trees: Basic terminologies, forest, tree representation (using array, using linked list). Basic trees, binary tree traversal (Pre-,in-,post-order), threaded binary tree(left, right, full), non recursive traversal algorithm using threaded binary tree, expression tree. Binary search tree-operations (creation, insertion, deletion, searching), Height balanced binary tree-AVL tree (insertion, deletion with examples only). B tree orations ((insertion, deletion with examples only)

Graph:

Graph definition and concept, (directed/undirected graph, weighted/un-weighted edges, sub-graph, degree, cut vertex /articulation point, pendant node, clique, complete graph, connected –strongly connected component, weakly connected component-path, shortest path, isomorphism.

Graph representation/storage implementation- adjacency matrix, adjacency list, adjacency multi-list. Graph traversal and connectivity- Depth First Search (DFS), Breadth-First Search (BFS), concept of edges used in DFS and BFS (tree-edge, back-edge, cross-edge, and forward-edge, application.

Minimal spanning tree-Prim's algorithm (Basic idea of greedy methods) [15]

Module 4

Searching, Sorting:

Sorting algorithm, Bubble sort and optimization, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (Concept, of max heap, application-priority queue, radix sort. Searching, sequential search, binary search, interpolation search.

Hashing, Hashing functions, collision resolution techniques. [10]

Text Books:

1. Data structure using C, Reema Thareja, Oxford.

2. Data structure, S.Lipschutz.

3. Data structure and program design in C, Robert L Krusse, B.P.Leung

Reference Books:

1. Data structure using C++, Varsha H. Patil, Oxford