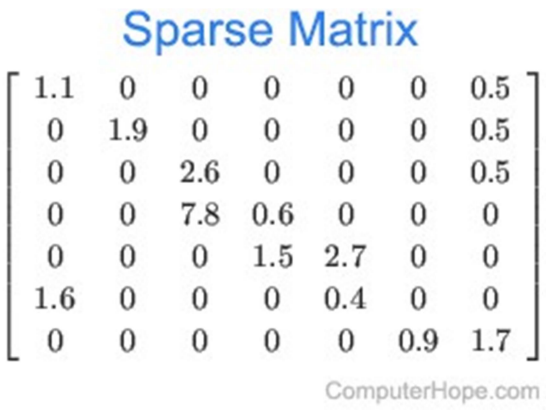
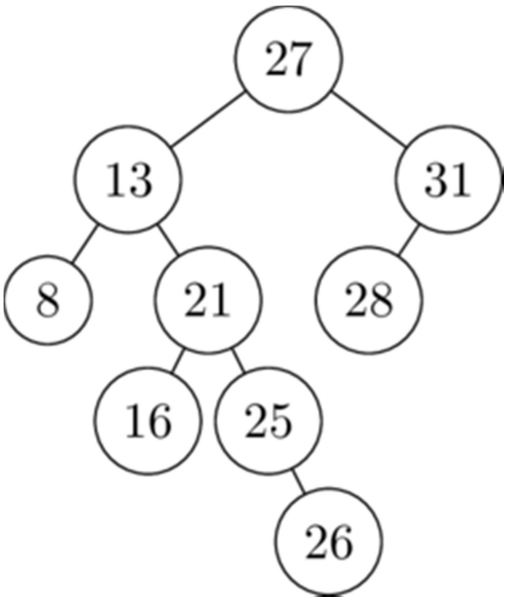
(IT/PC/B/S/211) Data Structures and Algorithms Lab

CO1: Develop programs to manipulate variants of lists represented by arrays, pointers and recognize their applicability (K3, A3).	**Assignment Set 1** 1. Write a C program to read array elements using pointers and print with addresses. 2. Write a C program to create a structure which will store the information about the students (Roll No, Name, and Percentage of Marks). a. Write a function to add a new record. b. Write a function to display all existing record. c. Write a function to search a record for any condition. d. Write a function to modify a record. 3. Write a C program to Create an array of 15 data. -> Inset an element after 6^{th} Data. -> Delete an element after 6^{th} Data. 4. Create a Linked list of 10 nodes. (Write a function InsertionAtend() and a function Traversal() to create this) 5. Write a menu driven C program to create a singly connected linked list and do the following operations on it: a. Write a function to insert a node at the beginning. b. Write a function to insert a node at the end. c. Write a function to insert a node at a specified position. d. Write a function to delete a node from a specified position. e. Write a function to count the number of nodes in linked list. f. Write a function to display the reverse linked list. 6. Write a menu driven C program to create a doubly linked list and do the following operations on it: a. Write a function to insert a node at a specified position. b. Write a function to delete a node from a specified position. c. Write a function to count the number of nodes in the linked list. d. Write a function to reverse the linked list. e. Write a function to traverse the list. 7. Write a program to add two polynomials using Linked List. for example, your

	program will ask to input two polynomials. If you Input: 1st polynomial = 5x^3 + 4x^2 + 2x^0 2nd polynomial = 5x^1 + 5x^0 Output: 5x^3 + 4x^2 + 5x^1 + 7x^0 8. Write a program that will create two link lists and lists are in sorted order and when you ask to merge them, it will merge the lists and generate a sorted list and display the resultant list. 9. Write a program that will create a link list and when you ask to split the list, it will split the list into two different lists of equal half and display the resultant lists. 10. Represent the following Matrix (Sparse Matrix) using a. Array b. Linked List  11. Write a program that will create a link list of integer numbers and when you ask to split the list, it will split the list into two different lists of odd and even numbers and display the resultant lists.
CO2: Develop	**Assignment Set 2**

programs involving stacks and queues (K3).	1. Write a C program to implement the following operations of stack (Using array): a. Write a function to creating the stack. b. Write a function to push an item to stack. c. Write a function to check the stack is Empty or not. d. Write a function to check the stack is Full or not. e. Write a function to pop an item to stack. 2. Write a C program to reverse a string using a stack (Using Array). 3. Write a C program to perform basic operations of a queue: a. Write a function to construct a linear queue. b. Write a function to insert an item in the queue. c. Write a function to delete an item from the queue. d. Write a function to count the number of item in the queue. e. Write a function to check overflow and underflow conditions. 4. Write a C program to implement stack and queue using link list. 5. Write a C program to implement circular queue using array. 6. Write a C program to reverse a string using a stack (Using Linked List). 7. Write a Program to evaluate the following postfix expression using stack and show the intermediate contents of stack. X = 6 2 3 + - 3 8 2 / + * 2 ^ 3 + 8. Write a Program to check an array of parenthesis "( )" whether it is well formed or not using stack. ((( )) (( ))) -> It is well formed ((( ))) -> It is well formed (()))((()) -> It is not well formed (((( )) () -> It is not well formed
CO3: Manipulate binary tree,	**Assignment Set 3**

binary search tree, and balanced binary search tree to illustrate operations performed on them and observe call trees for recursive functions (K3, A2).	1. Write a menu driven C program to create a binary tree and do the following operations using recursive method a. Perform in-order traversal. b. Perform pre-order traversal. c. Perform post-order traversal. 2. Write a menu driven C program to create a binary search tree and do the following operations a. Insert a new node into the tree. b. Delete a node from the tree. c. Find out the minimum number in the tree d. Find out the maximum number in the tree 3. Write a C program to seach an element in Binary Search Tree. 4. Write a C program to count the number of leaf nodes in a binary search tree. 5. Write a Program to check whether the following tree is AVL tree or not. If it is not a AVL tree, write a function to make it AVL tree. 
CO4: Convert algorithms for graph	**Assignment Set 4** 1. Write C programs for representing a given graph using

traversal to programs (K2)	a) Adjacency Matrix b) Adjacency List 2. Perform the following operations on that graph a. traversal the graph using Depth first traversal. b. traversal the graph using Breadth first traversal. 3. Write a C Program to form topological ordering of this graph.

CO5: Practice programs for several sorting and searching algorithms and study their performances. (K3, A2)

Assignment Set 5

1. Write a C program to search a number using linear search in an array of n numbers. The searching number will be asked to enter from keyboard. Message should be displayed indicating whether the search was a success or a failure. If it is a success case, the position of the number in the array is to be displayed.
2. Write C program for implementing Bubble sort methods to arrange a list of integers in ascending order.
3. Write C program for implementing Insertion sort methods to arrange a list of integers in ascending order
4. Write C program for implementing Merge sort methods to arrange a list of integers in ascending order
5. Write C program for implementing Quick sort methods to arrange a list of integers in ascending order
6. Write C program for implementing Selection sort methods to arrange a list of integers in ascending order
7. Write a C program to search a number using binary search algorithm from a list of integers.
8. Write a C program To Implement the hashing techniques.
9. Write a program to arrange an array of integer in following order:
    a. Odd indexed sub array (1, 3, etc) will be sorted in ascending order .
    b. Even indexed sub array (0, 2, etc.) will be sorted in descending order .

For example:

Before Execution:

70	80	40	20	10	30	60

After Execution:

70	20	60	30	40	50	10