Society for Computer Technology and Research's

Pune Institute of Computer Technology

Department of Computer Engineering

CLASS: S.E. **SEMESTER: IV**

SUBJECT: DATA STRUCTURES ALGORITHMS LABORATORY

Sr. No.	Problem Statement	CO
1.	A dictionary stores keywords and its meanings. Provide facility for adding new keywords, deleting keywords, updating values of any entry. Provide facility to display whole data sorted in ascending/ Descending order. Also find how many maximum comparisons may require for finding any keyword. Use Binary Search Tree for implementation. **OR** Beginning with an empty binary search tree. Construct the binary search tree by inserting the values in given order. After constructing binary search tree perform following operations 1) Insert a new node 2) Find numbers of node in longest path 3) Minimum and maximum data value found in tree 4) Change a tree so that the roles of the left and right pointers are swapped at every node 5)Search an element	**CO1** **CO3**
2.	Beginning with an empty binary tree, Construct binary tree by inserting the values in the order given. After constructing a binary tree perform following operations on it- • Perform inorder, preorder and post order traversal • Change a tree so that the roles of the left and right pointers are swapped at every node • Find the height of tree • Copy this tree to another [operator=] • Count number of leaves, number of internal nodes. • Erase all nodes in a binary tree. (Implement both recursive and non-recursive methods)	**CO1** **CO3**
3.	Create an inordered threaded binary search tree. Perform inorder, preorder traversals without recursion and deletion of a node. Analyze time and space complexity of the algorithm.	**CO1** **CO2**
4.	Consider telephone book database of N clients. Make use of a hash table implementation to quickly look up client's telephone number. Make use of two collision handling techniques and compare them using number of comparisons required to find a set of telephone numbers (Note: Use linear probing with replacement and without replacement)	**CO1** **CO2**
5.	Implement all the functions of a dictionary (ADT) using open hashing technique: separate chaining using linked list Data: Set of (key, value) pairs, Keys are mapped to values, Keys must be comparable, and Keys must be unique. Standard Operations: Insert(key, value), Find(key), Delete(key)	**CO1** **CO2**
6.	Represent a given graph using adjacency list to perform DFS and BFS. Use the map of the area around the college as the graph. Identify the prominent land marks as nodes and perform DFS and BFS on that. **OR**	**CO1** **CO3**

	There are fight paths between the cities. If there is a fight between the city A and city B then there is an edge between the city A to B. The cost of an edge represent the time required or fuel required to travel from city A to B. Represent this as a graph using adjacency list where every node of graph represented by city name. Perform following operations 1) calculate in degree, out degree of vertices 2)check whether graph is connected or not	
7.	You have a business with several offices; you want to lease phone lines to connect them up with each other; and the phone company charges different amounts of money to connect different pairs of cities. You want a set of lines that connects all your offices with a minimum total cost. Solve the problem by suggesting appropriate data structures. **OR** Tour operator organizes guided bus trips across the Maharashtra. Tourists may have different preferences. Tour operator offers a choice from many different routes. Every day the bus moves from starting city S to another city F as chosen by client. On this way, the tourists can see the sights alongside the route travelled from S to F. Client may have preference to choose route. There is a restriction on the routes that the tourists may choose from, the bus has to take a short route from S to F or a route having one distance unit longer than the minimal distance. Two routes from S to F are considered different if there is at least one road from a city A to a city B which is part of one route, but not of the other route	**CO1** **CO4**
8.	Given sequence k = k1 <k2 < … <kn of n sorted keys, with a search probability pi for each key ki. Build the Binary search tree that has the least search cost given the access probability for each key.	**CO1** **CO4**
9.	A Dictionary stores keywords and its meanings. Provide facility for adding new keywords, deleting keywords, updating values of any entry. Provide facility to display whole data sorted in ascending/ Descending order. Also find how many maximum comparisons may require for finding any keyword. Use Height balance tree and find the complexity for finding a keyword.	**CO1** **CO3**
10.	Implement the Heap sort algorithm demonstrating heap data structure with modularity of programming language **OR** Read the marks obtained by students of second year in an online examination of particular subject. Find out maximum / minimum marks obtained in that subject. Use heap data structure. Analyze the algorithm.	**CO3**
11.	Department maintains a student information. The file contains roll number, name, division and address. Allow user to add, delete information of student. Display information of particular employee. If record of student does not exist an appropriate message is displayed. If it is, then the system displays the student details. Use sequential file to main the data.	**CO5**
12.	Implementation of a direct access file -Insertion and deletion of a record from a direct access file	**CO5**