###### Army Institute of Technology

**DEPARTMENT: COMPUTER ENGINEERING**

**Assignment List**

Subject: Data Structures and Algorithms Lab Class: SE (Comp)- Div-B , SEM: II Academic Year: 2021-22 Teaching Staff: Prof.Msngesh Hajare,

Prof.Amrapali Waghmare

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| **As. No** | **Assignment statement** |
|  | **GROUP A** |
| 1 | Consider student database of N clients . Make use of a hash table implementation to quickly look up telephone number. Implement collision handling techniques- 1. linear probing 2. linear probing with chaining without replacement 3. linear probing with chaining with replacement and also print number of comparisons required to find a client.  virtual lab link -https://ds1-iiith.vlabs.ac.in/exp/hash-tables/index.html |
| 2 | Implement all the functions of a dictionary (ADT) using hashing and handle collision using chaining with/without replacement.  Data : set of(key, value) , keys are mapped to values,keys must be comparable, keys must be unique. Standard operations: Insert(key, value), Find(key), Delete(key) |
|  | **GROUP B** |
| 3 | Create binary tree/binary search tree with n nodes, do following operation 1. Insert a node  2. all traversals (recursive and iterative) 3. find the height of a tree. 4. Create clone of a tree and then erase all nodes in a original tree. 5.  create a Mirror image of a tree. 6. construct a binary tree from inorder and preorder traversal  7. delete a node from binary search tree 7. Check whether two trees are equal. |
| 4 | Create  inorder threaded binary search tree and implement following operations  1.Insert a new node 2. Inorder and preorder traversal 3.Convert given binary search tree into  threaded binary search  tree. |
| 5 | Write a c++ program to implement Huffman coding text compression algorithm. Build the huffman Tree using characters and their frequencies input from user. Encode a given string by using codes generated from huffman tree and decode the bit sequence entered by the user |
|  | **GROUP C** |
| 6 | Write a program to represent input graph using adjecency matrix. Implement Depth First and breadth first traversal algorithms. Check if graph is connected, if not find how many connected components it has. |
| 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 and using prim's and kruskal's algorithm |
| 8 | 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. |
| 9 | Write a c++ program to print topological order of given Directed acyclic Graph |
|  | **GROUP D** |
| 10 | A Dictionary stores keywords & 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. |
| 11 | 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.  test your program for following example  p1 = 10, p2 = 3, p3 = 9, p4 = 2, p5 = 0, p6 = 10;  q0 = 5, q1 = 6, q2 = 4, q3= 4, q4 = 3, q5 = 8, q6 = 0. |
|  | **GROUP E** |
| 12 | Implement the Heap/Shell sort algorithm implemented in Java demonstrating heap/shell data  structure with modularity of programming language |
|  | **GROUP G** |
| 13 | Department maintains student information. the file contains rollno, name, division, and address. Allow user to add, delete, insert and search information of student. use sequential file to maintain the data |
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**Subject In-Charge H.O.D**

**(Prof.Mangesh Hajare, Prof.Amrapali Waghmare) Comp Engg. Dept.**