Enrollment No: _____ Exam Seat No:_____

C. U. SHAH UNIVERSITY
Winter Examination-2021

Subject Name : 4TE03DFS1

Subject Code : Data and File Structure **Branch: B.Tech (CE)**

Semester : 3 **Date : 18/01/2022** **Time : 11:00 To 02:00** **Marks : 70**

Instructions:
(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) Which of these best describes an array?
A. A data structure that shows a hierarchical behavior
B. Container of objects of similar types
C. Arrays are immutable once initialized
D. Array is not a data structure

b) What is the worst case time complexity of inserting a node in a doubly linked list?
A. O(nlogn)
B. O(logn)
C. O(n)
D. O(1)

c) Which of the following properties is associated with a queue?
A. First In Last Out
B. First In First Out
C. Last In First Out
D. Last In Last Out

d) What does 'stack overflow' refer to?
A. accessing item from an undefined stack
B. adding items to a full stack
C. removing items from an empty stack
D. index out of bounds exception

e) What will be the result of assigning a value to an array element whose index exceeds the size of the array?
A. Compilation error
B. The element is initialized to 0.
C. The compiler will automatically increase the size of the array.
D. The program may crash if some important data gets overwritten.

f) Can linear search take lesser number of comparisons than binary search to find an element in an array?

A. Yes
B. No

g) Which among the following sorting algorithm will take least time when all elements of input are identical?
A. Insertion Sort
B. Merge Sort
C. Both would take same time.

h) In the mergesort algorithm, what is the asymptotic running time of the step of merging sorted subarrays?
A. O(log n)
B. O(n)
C. O(n log n)
D. O(n^2)

i) Preorder traversal of a BST is 5,4,3,2,10,9,12. What will be the postorder traversal of the tree?
A. 2,3,4,5,9,10,12
B. 2,3,4,10,12,9,5
C. 2,3,4,9,12,10,5
D. Cannot be determined From data given in Question

j) The maximum number of binary trees that can be formed by 3 nodes is:
A.3
B.9
C.1
D.5

k) Given a hash table with 100 slots that stores 1000 elements. What is the load factor (α) for the table
A. 0.01
B. 0.1
C. 1
D. 10

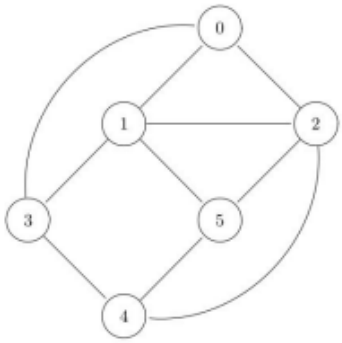
l) The minimum spanning tree will be useful in which of the following scenarios: A. Telecommunications company laying cable to a new neighborhood.
B. By an airline laying out flight routes.
C. By an architect to lay out corridors between offices in a new office building D. None of the Above E. All of the Above

m) Correct choice of data structures can improve the performance of algorithms. Match the following algorithms with appropriate data structures:

i. Breadth first search	a. Heap
ii. Depth first search	b. Stack
iii. Sorting	c. Queue

A. ia iib iiic
B. ib iia iiic
C. ic iib iiia
D. ib iic iiia

n) The search starts at vertex 0 and lexicographic ordering is assumed for the edges emanating from each vertex.



A. 0 1 2 4 3 5
B. 0 1 2 5 4 3
C. 0 1 2 3 4 5
D. 0 1 3 4 2 5

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	a	How can we do performance analysis of algorithm? Explain with example.	**7**
	b	Define data structure. Also explain various types of data structure with example of each	**7**
Q-3		**Attempt all questions**	**(14)**
	a	What is linked list? Is it linear or nonlinear data structure? What are the advantages of linked list over arrays?	**7**
	b	Define Stack and queue. Also differentiate them.	**7**
Q-4		**Attempt all questions**	**(14)**
	a	Write a recursive function to calculate height of binary tree in java	**7**
	b	What are the difference between the Breadth First Search (BFS) and Depth First Search (DFS)? Also differentiate tree and graph data structure.	**7**
Q-5		**Attempt all questions**	**(14)**
	a	Implement a Binary search Algorithm without recursion	**7**
	b	Write down and explain merge sort algorithm with the help of example.	**7**
Q-6		**Attempt all questions**	**(14)**
	a	Write a note on Random File Organization	**7**
	b	What is index file? How indexing is beneficial in file storage?	**7**
Q-7		**Attempt all questions**	**(14)**
	a	What is augmented Data Structure? Write Algorithm for augmenting data structures. Also explain it with the help of example.	**7**
	b	Explain Graham's scan algorithm.	**7**
Q-8		**Attempt all questions**	**(14)**
	a	Define Hash function and Hash Value. Also compare hashing and hash table.	**7**
	b	What is hash collision? Explain using example. How can we resolve this collision?	**7**