

Exam.Code:0921
Sub. Code: 6474

2074

B. E. (Information Technology), Third Semester
PC-IT-301: Data Structures

Time allowed: 3 Hours

Max. Marks: 50

x-x-x

Note: Attempt five questions in ALL by selecting at most TWO questions from each section. Question ONE is Compulsory. All questions carry equal marks. Answer ALL parts of a Section and Question together. Marks of the questions are given in front of them. Write answer to the point only. Show each step in the derivations. Direct solution to the problem will not be considered for awarding the marks. Start a fresh question from a fresh page only.

1. Write answer in brief? Show each step of derivation. Wherever possible **10X1** use suitable example in support of your answer.
 - (a) What is role of indexing in array data structure?
 - (b) What are two problems with arrays?
 - (c) Is it possible to define a header linked list with the help of doubly linked? If 'Yes' Write the syntax of header node and information node.
 - (d) Binary search fails when data is not sorted? Why?
 - (e) Hashing ease the operation on data list. Is it always possible with chaining hashing scheme?
 - (f) Is Spanning tree constructed using Kruskal's algorithm always produces least cost spanning tree? Why?
 - (g) Is Heap another form of BST?
 - (h) How the principle of heap leads in defining the heap binary tree?
 - (i) Why rotations are used in height balanced binary tree?
 - (j) A graph is defined as a set of two tuples $G(V, E)$. Is it true? Prove?

P.T.O.

Section-A

2. (a) Prove that: $2n + 1 \leq 2^n$ for all $n \geq 3$ 2+4+4
 (b) Desired pocket information insertion and deletion in an array is always $O(n)$. Write algorithm(s) to perform the above said operation.
3. (a) Define header linked list. Write a method which inserts information into a single header linked list at desired place. 2x5
 (b) What is priority queue? Write an algorithm to insert into the priority queue. Compute its time and space complexity.
4. What is use of peek operation in stack implementation? Write an algorithm to perform peek operation to find the availability of given information in a given stack. What is space complexity of defined algorithm? Discuss with the suitable example. 2+5+1+2

Section-B

5. (a) What is principle of radix sort? Discuss radix sort algorithm with the help of suitable example. 2x5
 (b) What are limitations of complete binary tree? How these limitations will be reduced using threaded binary tree? Discuss with the help of suitable example.
6. (a) What is B-tree? Construct 4-tree for the following data set. 2, 3, 4, 5, 101, 99, 98, 23, 12, 89, 78, 66, 11, 32, 45, 77, 68, 30. 2x5
 (b) Differentiate between depth first and bread first search algorithms. Wherever possible use suitable example(s) in support of your answer.
7. (a) Write an algorithm for insertion sort when one list represents the data set and another blank list is used to sort the data. What is space and time complexity of defined algorithm? 2x5
 (b) Find the number of comparison performed when characters of string "DATA STRUCTURES" are arranged in sorted order using selection sort. Show each step of derivations.