NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR
Department of Computer Science and Engineering
Major Exam (Spring 2017)

Course: Data structures | Semester: 4th (IT)
Time Allotted: 2 hours | Max Marks: 60
Dated: 06.07.2017 | Credits: 04

Note: Do only 4 questions.

Q1 a) Write a C function for finding maximum element in a binary search tree.

b) You are given an empty hash table of size 7 that uses open addressing. The following sequence of keys is to be inserted: 15 17 8 23 3 5
Insert these keys using each of the following approaches. If overflow occurs, say so, and indicate the element that causes the overflow.
   a. h(x) = x % 7; linear probing
   b. h(x) = x % 7; quadratic probing
   c. h(x) = x % 7; double hashing with h2(x) = x / 7 + 1 (using integer division)

c) Construct a binary tree from the traversal order given below
PREORDER: A B D E F C G H L J K
INORDER: D B F E A G C L J H K

(6,6,3)

Q2 a) Write a C function to delete max element from a max heap. Explain, its working with the help of an example. Also write its time complexity.

b) Derive the equation for finding the height of a binary tree with 'n' no of nodes.

c) Explain the following with the help of examples:
   I. Binary tree.
   II. Strictly Binary tree.
   III. k-ary tree.
   IV. Complete Binary tree.

(8,3,4)

Q3 a) Write a program to implement circular queue.

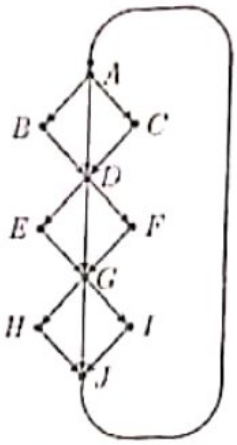
b) Insert 14, 17, 11, 7, 53, 4, 13 into an empty AVL tree. Explain all the steps needed for maintaining the balance factor of AVL tree.

c) Construct a binary search tree from preorder sequence of nodes 10 7 4 3 8 12 11 17 16 15. Also find the balance factor of all the nodes in the resulting Binary Search tree.

(6,6,3)

Q4 a) Write an algorithm for Breadth First Search of a graph.

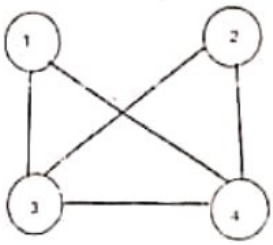
b) Apply the breadth first search and depth first search algorithms on the given graph starting at A.



c) Given that mergesort's worst case time complexity is better than quicksort's time complexity, why is quicksort so commonly used in practice?

(6,6,3)

Q5 a) Apply Kirchhoff's Theorem to find no of spanning trees in the given graph.



b) Write an algorithm for merge sort. Also explain with the help of example.

c) Write a C function to reverse a string using stack.

(5,5,5)