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National Institute of Technology, Delhi

Name of the Examination: B. Tech.			
Branch	: All Branches(CSE,ECE& EEE)	Semester	: II
Title of the Course	: Data Structures	Course Code	: CSB102

Time: 3 Hours **Maximum Marks: 50**

Note : All parts of section A are compulsory.
Attempt any four questions in section B.
Attempt any two questions in section C.

SECTION A

Q1) Attempt all parts. [1*10]

i. Which data structure is used to perform recursion?

ii. Convert the expression ((A + B) * C - (D - E) ^ (F + G)) to equivalent Prefix and Postfix notations.

iii. Does the minimum spanning tree of a graph give the shortest distance between any 2 specified nodes?

iv. The following formula is of which data structure.

Left_subtree(keys) ≤ node(key) ≤ Right_subtree(keys)

v. Which algorithmic approach tries to achieve localized optimum solution of a problem. Explain

vi. What is a threaded binary tree?

vii. List out some advantages of circular Queue over Queue.

viii. What are height balanced trees and why they are required.

ix. _____ data structure is used to implement DFS and _____ data structure is used to implement BFS.

x. What is the main difference between a graph and a tree.

SECTION B

Q2) What are priority queues? Write an algorithm to insert an element in a priority queue [5]

Q3) Suppose Z is the following list of 14 alphabetic characters:

D A T A S T R U C T U R E S

Suppose the characters in Z are to be sorted alphabetically. Use the quicksort algorithm to find the final position of the first character D. Show each step of execution. [5]

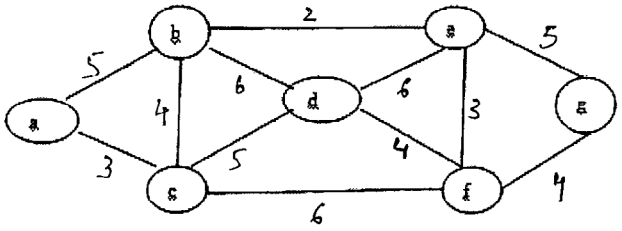
Q4) Insert the following nodes into an AVL tree : show the stepwise rotations required

13, 10,15, 5, 11, 16, 4, 6, 14, 3, 7,14,17, 20, 22, 8 [5]

Q5) a) The following numbers are inserted into an empty binary search tree in the given order: 10,1,3,5,15,12,16. What is the height of the binary search tree. [2.5]

b) Explain all the three cases of deletion in a binary search tree. Delete nodes having key value 10, 15, 16 from the BST formed in Q5 part (a) [2.5]

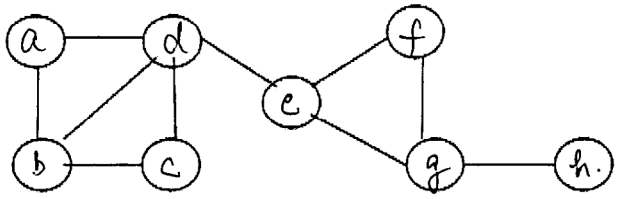
Q6) What do you understand by a Minimum Spanning Tree(MST) . Create a MST of the given graph by using *Prim's* algorithm.



SECTION C

Q7) a) what do you understand by hashing. Discuss about the needs and advantages of doing hashing [4]
b) What are the collision resolution techniques used in hashing. Elaborate [6]

Q8) Discuss the procedure used in traversing a graph using Breadth first search. Write the algorithm for the same. For the given graph call the BFS procedure and draw the resulting tree [10]



Q9) a) Discuss the differences between Greedy approach, dynamic programming and divide and conquer. Give examples of problems solved by these approaches respectively [5]
b) Which of the above mentioned approach is used to perform quick sort. Write the code for performing quick sort [5]