PSG TEC Course Code: 15l303 No of Pages: 2

Roll No:

(To be filled in by the candidate)

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

SEMESTER EXAMINATIONS, **MAY 2018**

BTech - INFORMATION TECHNOLOGY Semester: 3

DATA STRUCTURES **15I303**

Maximum Marks: 100 Time: 3 Hours

INSTRUCTIONS:

- 1. Answer **ALL** questions. Each question carries 20 Marks.
- 2. Subdivision (a) carries 3 marks each, subdivision (b) carries 7 marks each and subdivision (c) carries 10 marks each.
- a) Write a program to check whether the given linked list consists of duplicate values or not. If exists, remove the value.
 - b) Develop an efficient algorithm to find the third largest element in an array of distinct elements. For example, if the input array is arr[] = {1, 14, 2, 16, 10, 20}, then the third largest element is 14. Analyze the time complexity.
 - c) Given a singly linked list, rotate the linked list counter-clockwise by 'k' nodes, where 'k' is a given positive integer. For example, if the given linked list is 10->20->30->40->50->60 and 'k' is 4, the list should be modified to 50->60->10->20->30->40. Assume that 'k' is smaller than the count of nodes in linked list.
- 2. a) Distinguish double ended queue and priority queue over generic queue.
 - b) Is it possible to implement a queue using stacks and a stack using queue? If so, devise an algorithm for the same.
 - c) Convert the infix expression 1²*3-4+5/6/(7+8) to equivalent postfix expression and evaluate the postfix expression.
- Construct the binary tree from the given traversals

Inorder: GEDABIF

Preorder: DEGIABF

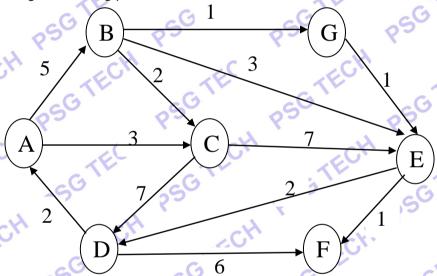
- PSG TECH PSG TECH PSG TECH PSG TECH PSG TECH b) Write the routines for the following in binary search tree
 - a) To insert elements
 - b) To search for a value
 - To delete a node with 1 child
 - To count the number of leaves

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c) i) Insert the following values into an AVL tree: 53, 56, 61, 63, 37, 33, 41, 39, 38 and 31. From the resultant tree, delete the following nodes in the given order: 61, 33 and 41.

- Write a function to check whether the two given nodes are cousins in a BST. Two nodes are said to be cousins if they are at the same level and have different parents such that the root node is at level '0'.
- Brief the different ways of representing a graph 'G'.
 - b) Illustrate Floyd Warshall algorithm to find the shortest path of the given graph 'G'.
 - c) Develop a program for BFS() traversal using adjacency matrix representation. Trace the code for the following graph and display adjacency matrix, BFS and DFS values by assuming the starting point as 'A'.



Graph 'G"

- Compare and contrast linear search with binary search in terms of complexity.
 - b) Given the following input (4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199) and the hash function $h(x) = x \mod 10$. In case of collision, resolve it by applying linear probing, quadratic probing and chaining method and show the resultant hash table.
 - PSG TECH PSG TECH c) Sort the following values using merge sort and quick sort: 56, 78, 26, 40, 47, 98, 38, 44, 77, 88 and 20. Also, analyze the time complexity.

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FD/JU