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R. V. COLLEGE OF ENGINEERING
Autonomous Institution affiliated toVTU
III Semester B. E. Examinations Nov/Dec-18
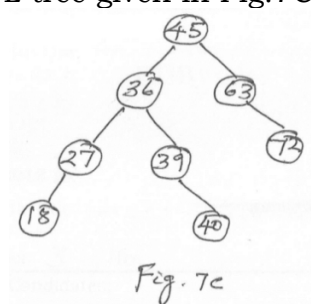## Computer Science and Engineering
DATA STRUCTURES USING C

Time: 03 Hours   *Maximum Marks: 100*

Instructions to candidates:
1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B.In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART-A

1	1.1	What data structure is best to answer question like "what is the item at position n"?	01
	1.2	State the memory region used in dynamic memory allocation?	01
	1.3	How many times is the recursive function called, when the following code is executed? $void\ fun1(int\ n)$ { $if\ (n == 0)\ return;$ $printf("\%d", n);$ $fun1(n-1)$ } $int\ main()$ { $fun1(10);$ $return\ 0;$ }	01
	1.4	What is *AVL* tree?	01
	1.5	Given a Binary Search Tree (*BST*), how to print its values in ascending order?	01
	1.6	Name the linked list that stores the address of the header node in the addr field of the last node?	01
	1.7	Evaluate the postfix expression: $32, 4, /, 2, *, 12, 3, -, +$	02
	1.8	Given pointer to node '*x*' in a singly linked list, delete the node '*x*' from the given linked list (pointer to starting node is not given).	02
	1.9	Write a recursive *C* routine to print the elements of a singly linked list in a reverse order, without actually reversing the list.	02
	1.10	If h denotes the height of a binary tree, the number of nodes in a complete binary tree can be denoted through h as _____.	02
	1.11	On constructing a max heap for the given set of elements (top-down method) what will be the left and right child of the root node? $45, 36, 54, 27, 63, 72, 61, 18$	02
	1.12	There is a tree where the left subtree contains 1000 nodes and the right subtree contains 100 nodes. For preorder and postorder traversals how many nodes are processed before the root?	02
	1.13	Write a non-recursive algorithm or function to perform the preorder traversal on a binary tree.	02

PART-B

2	a	Compare linear and non-linear data structures.	04
	b	Write a C program to generate the Fibonacci series until n using recursion.	04
	c	Write an algorithm or a C function using stack to check for balanced parenthesis showing the stack contents trace the code for the following input: $\{1 + (2 - [3 + 4]) * 5 - [(6 + 7)]\}$	08

3	a	What is dynamic memory allocation? Differentiate static with dynamic memory allocation.	04
	b	Discuss the Enqueue operation on a linear queue.	04
	c	Write a C program to implement a message queuing system using circular queue.	08

OR

4	a	With syntax, explain the functions used for memory allocation in dynamic memory allocation.	04
	b	Discuss the dequeue operation on a circular queue.	04
	c	Write a C program to implement a queue using stacks.	08

5	a	Write a C function to concatenate two non-empty circular linked lists.	04
	b	Write a C function to reverse a doubly linked list using recursion.	04
	c	Discuss the implementation of a stack using a singly linked list with header node.	08

OR

6	a	Write a C function to create an ordered singly linked list.	04
	b	Write a C function to reverse a circular linked list with header node.	04
	c	Implement a dynamic queue using doubly linked list.	08

7	a	Discuss the deletion operation in binary search tree with an example.	04
	b	Draw a binary tree given following inorder and postorder traversal sequences of nodes.	04

Inorder:	D	B	H	E	I	A	F	J	C	G
Postorder:	D	H	I	E	B	J	F	G	C	A

	c	Perform The following: i) Construct an AVL tree by inserting the following elements in the given order: $63, 9, 19, 27, 18, 108, 99, 81$ ii) Consider the AVL tree given in Fig.7C and delete 72 from it.	

Fig. 7c

			08

8	a	Construct a splay for the following elements 2,1,4,5,9,3.	04
	b	Discuss the ExtractMin operation on a min heap.	04
	c	Define collision in hashing? Discuss the various methods of resolving collision. Consider a hash table of size= 10. Using double hashing, inserts the keys 72,27,36,24,63,81,92 and 75 into the table. [Take $h_1 = (k \bmod 10)$ and $h_2 = (k \bmod 8)$]	08