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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

III Semester B. E. Fast Track Examinations January-2023

Computer Science 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 is the deletion operation on a queue referred as?	01
	1.2	In the Tower of Hanoi problem, how many moves are carried out to transfer 6 discs from source to destination.	01
	1.3	Dynamic memory is allocated from _____ section of process memory.	01
	1.4	What is the return type of malloc function?	01
	1.5	Write the equivalent postfix expression for the given infix expression $(A + B) * (C * D - E) * (F/G)$	02
	1.6	A Queue can be implemented using linked list by _____ and _____ operations on it.	02
	1.7	A circular queue of SIZE 5 has three elements 10,20 and 30 where front=0 and rear=Z. Show the value of front and rear after each of these operations: i. Insert 40 ii. Insert 50 iii. Insert 60 iv. Delete an item.	02
	1.8	What is the output of the following code for the input $x = 5$ and $y = 6$ . <pre>int something (int x,int y) {     if (y == 1)         return x;     else         return x + something (x,y - 1); }</pre>	02
	1.9	Consider the following definition <pre>Strcut node {     int data;     struct node * next; } typedef strcutnode * NODE; NODE ptr;</pre> Write corresponding C code (statement) to create a new node?	02

1.10	Construct a binary tree from the given transversal	<table><tr><td>Inorder:</td><td>D</td><td>B</td><td>H</td><td>E</td><td>I</td><td>A</td><td>F</td><td>J</td><td>C</td><td>G</td></tr><tr><td>Postorder</td><td>D</td><td>H</td><td>I</td><td>E</td><td>B</td><td>J</td><td>F</td><td>G</td><td>C</td><td>A</td></tr></table>	Inorder:	D	B	H	E	I	A	F	J	C	G	Postorder	D	H	I	E	B	J	F	G	C	A	02
Inorder:	D	B	H	E	I	A	F	J	C	G															
Postorder	D	H	I	E	B	J	F	G	C	A															
1.11	What does the following function do for a given singly linked list with first node as start? <i>void fun(struct node * start)</i> { <i>If (start == NULL)</i> <i>return;</i> <i>fun(start → next);</i> <i>printf("%d", start → data);</i> }		02																						
1.12	Draw the hash table for the following data keys: 124, 132, 146, 115, 95, 88, 99, 145, 23, 37. <i>Hash function: key %8</i> <i>Method used: Sepearate chaining</i>		02																						

### PART B

2	a	Design an algorithm to evaluate a postfix expression. Trace the same with stack contents for the following expression; 6 5 2 3 + 8 * + 3 + *	08
	b	Write recursive function in C to <ol style="list-style-type: none"> <li>Simulate the tower of Hanoi problem</li> <li>To check whether array elements are sorted or not (in ascending order)</li> </ol>	08
3	a	What are the advantages of dynamic allocation over static allocation? With examples, discuss the functions that support the dynamic memory allocation in C.	08
	b	Write a C program to implement a circular queue of integers.	08
		<b>OR</b>	
4	a	What is a Queue? Develop C functions to perform Enqueue & Dequeue operations on it.	08
	b	Differentiate between malloc and calloc functions.	04
	c	Develop a C program to find the sum of n elements using dynamic memory allocation.	04
5	a	Build C functions to construct a singly linked list to perform the operations of a stack of integers.	08
	b	Write function in C to <ol style="list-style-type: none"> <li>Non-recursive function to reverse singly linked list</li> <li>To insert a node at rear end in a doubly linked list</li> </ol>	08
		<b>OR</b>	
6	a	Write necessary functions to implement a queue of integers using circular singly linked list.	08
	b	Write function in C to <ol style="list-style-type: none"> <li>To search a doubly linked list for the given key element</li> <li>To concatenate two singly linked lists.</li> </ol>	08

7	a	For the given data, draw a binary search tree 100, 85, 45, 55, 110, 20, 70, 65, 44	04
	b	Construct an AVL Tree for the following data: <i>C O M P U T E R</i>	04
	c	Draw a binary tree for the following expression: $2 * 3 / (2 - 1) + 5 * (4 - 1)$	04
	d	Write a C function to create a binary search tree of integers.	04
8	a	Develop a C function to construct a max heap of integers. Apply the same to the keys: 8, 15, 7, 6, 20, 10, 35.	08
	b	What is collision? How is chaining methodology different from open addressing method in resolving hash collisions? Explain.	08