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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: III**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 19IS3PCDSC **Max Marks: 100**
Course: DATA STRUCTURES WITH C **Date: 27.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a)	Design C functions to perform the following operations: i) Reversing a given singly linked list ii) Deleting a given node in a singly linked list	**10**
	b)	Write C program to implement a stack using singly linked list.	**10**

OR

2	a)	A blood bank maintains a list of blood donors. Each donor's name, age, address, blood group and phone number is stored. Design a C program to maintain these details in a singly linked list. Operations like searching donors of a given blood group and insertion of a new donor should be enabled.	**10**
	b)	Discuss with a neat diagram of how a polynomial can be represented as an ordered singly list of non-zero terms.	**05**
	c)	Differentiate between Static and Dynamic memory allocation.	**05**

UNIT - II

3	a)	A calculator program is to be designed for an application. The input to the program is an infix arithmetic expression like 3*(7-2), and the output expected is 15. Design the data structure and algorithm for this program. The algorithm should read the expression and compute the result.	**12**
	b)	Write C program to check whether the given string is a palindrome using double linked list. Consider each character in the string is stored in a node.	**08**

UNIT - III

4	a)	Analyze functionalities of Priority Queue for real-time applications and implement C routines to perform insert and delete operations on it.	**10**

	b)	Outline the algorithm to convert a valid Infix expression to its equivalent Postfix expression. Also trace the same for the infix expression: **A * (B + (C – D) / E) $ F**	**10**

UNIT - IV

5	a)	Discuss the 3 cases of deleting a node from a Binary Tree with a C function.	**06**
	b)	Construct a Binary Tree when the following Traversals are given: i) Preorder: A B J C D E G H F I Inorder: J B D C A G H E F I ii) Postorder: L J I D C H G F K E A Inorder: L D J I C A G H F E K	**08**
	c)	Design an algorithm to insert an element into a given Binary Search Tree.	**06**

OR

6	a)	Develop a C program to perform the following operations on a Binary Search Tree. i) Insertion ii) Deletion iii) Postorder traversal	**12**
	b)	Illustrate structure definition of right in - threaded binary tree. Implement a C routine to insert into that tree.	**08**

UNIT - V

7	a)	What are Red-Black Trees? Mention the rules that every Red-Black tree should follow.	**07**
	b)	Mention the advantages and disadvantages of Splay Trees.	**06**
	c)	Construct an AVL tree for the following sequence of elements: 55, 10, 25, 32, 23, 90, 85, 67	**07**

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