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

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**
Course Code: 20AM3PCDST **Max Marks: 100**
Course: Data Structures

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

UNIT - I

1. a) Define dynamic memory allocation. List and explain various dynamic memory allocation functions. **10**

   b) What is data structure? Discuss the classification of data structure. **10**

UNIT - II

2. a) Define a stack. Explain the different operations that can be performed on stack using C functions and detail them using diagrammatic representation. **10**

   b) Write and explain how to implement the operations of stack using singly linked list (SLL) with the help of functions. **10**

OR

3. a) Write a C function to evaluate the given postfix expression along with the stact trace **10**

   2 3 1 * + 9 -

   b) Implement rear insertion and front deletion of a NODE on a Doubly Linked List with required functions. **10**

UNIT - III

4. a) List out the different types of queues. State the limitations of ordinary queue. Explain how to overcome the limitations by specifying the required C functions and diagrammatic representation with an example. **10**

   b) Define recursion. Write a C recursive function for Tower of Hanoi and trace the function for 3 disks with call tree diagram. **10**

UNIT - IV

5. a) Write a recursive function to search a key value in a Binary Search Tree. Construct a BST for the given values : 7, 4, 12, 3, 6, 8, 1, 5, 10 **10**

   b) Create an expression tree for a given expression a + (b * c) + d * (e + f) and write C routines to traverse the tree using inorder, preorder and postorder **10**

UNIT - V

6. a) Define AVL Tree. Construct an AVL tree by inserting the following elements in the given order. 63, 9, 19, 27, 18, 108, 99, 81 **10**

   b) Discuss the properties of a red-black tree. Explain the process of insertion into red black tree. **10**

OR

7. a) Define splay tree. Discuss the splaying operations performed on splay tree with an example. **10**

   b) Create a Red Black tree by inserting following sequence of numbers 8,18,5,15,17,25,40 and 80 **10**

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