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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: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**
Course Code: 20AM3PCDST **Max Marks: 100**
Course: Data Structures **Date: 14.09.2023**

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) Summarize dynamic memory allocation functions with syntax and examples. **6**

   b) Write the C functions for the following : **7**
   i. Concatenation of two singly linked lists.
   ii. Counting number of nodes (length) singly linked list.

   c) Write the C functions for the following **7**
   i. Deletion of a specified node in singly linked list.
   ii. Deletion of a node at end of singly linked list.

UNIT - II

2. a) Explain the following operations using appropriate logical code snippets **7**
   i. Inserting a new node at the end of circular singly linked list.
   ii. Deletion of first node in circular singly linked list.

   b) Implement C functions to demonstrate the working of the following operations. **7**
   i. Deletion of specified node in doubly linked list.
   ii. Counting the number of nodes in doubly linked list.

   c) Apply infix to postfix conversion algorithm and convert the following given infix expressions to their equivalent postfix. **6**
   i. (a + b) * d + e / (f + a * d) + c
   ii. A * (B + C) * D

OR

3. a) Using pictorial representations and equivalent functions, explain the following in detail **7**
   i. Inserting a node at front of circular doubly linked list.
   ii. Deleting a node at the end of circular doubly linked list.

b) Write appropriate C functions to demonstrate the following operations: **7**

i. Search a given KEY in doubly linked list.

ii. Concatenation of two doubly linked lists.

c) Make use of postfix evaluation algorithm and evaluate the given postfix expressions. **6**

i. a b / c – d e * + a c * + where a=6, b=3, c=1, d=2, e=4

ii. 6 2 / 3 – 4 2 * +

UNIT - III

4. a) Write recursive functions for the following. **7**

i. Tower of Hanoi

ii. Ackerman's function.

b) Write the C functions to show the working of insert, delete and display operations of circular queue. **7**

c) Develop the following algorithms for one way list representation of priority queues **6**

i. Insertion

ii. Deletion

UNIT - IV

5. a) For the given list of elements : 100, 85, 45, 55, 110, 20, 70, 65 construct the equivalent Binary Search tree in the form of linked list representation. **7**

b) Using the given preorder and inorder sequences, construct the corresponding binary tree. **7**

Preorder : A B C D E F G H I

Inorder : B C A E D G H F I

c) Construct the threaded binary tree for the given list of elements. **6**

10, 20, 30, 40, 50

UNIT - V

6. a) Explain the operations of the following with suitable examples. **10**

(a) AVL trees

(b) Red Black trees

b) Construct AVL tree for given elements. **10**

8 , 18, 28, 23, 25, 5, 2

OR

7. a) Explain the working of splay tree in detail **10**

b) Construct a Red Black Tree for the given elements **10**

9, 20, 7, 18, 20, 21, 38, 51, 85

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