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18MCA22

Second Semester MCA Degree Examination, June/July 2019

Data Structures using C++

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. What are data structures? Explain the classification of data structures, with neat diagram. (10 Marks)
- b. Write an ADT for Array. (04 Marks)
- c. Define stack. Write an ADT for stack. (06 Marks)

OR

- 2 a. Write an algorithm to convert an infix expression to postfix. Trace the algorithm for following infix expression $((A - (B + C)) * D) \$(E + F)$. (10 Marks)
- b. Write an algorithm to evaluate a postfix expression. Trace the algorithm for following postfix expression showing contents of stack: $6\ 2\ 3\ +\ -\ 3\ 8\ 2\ /\ +\ * \ 2\ \$\ 3\ +$ (10 Marks)

Module-2

- 3 a. Define recursion. Write an algorithm to find factorial of a given number n. Trace the same for $n = 4$ by showing contents of stack. (10 Marks)
- b. Write a C++ program to solve tower of Hanoi problem. Trace the same for $n = 3$ disks. (10 Marks)

OR

- 4 a. What is queue? Write algorithms for the primitive operations performed on a queue. (10 Marks)
- b. Write a C++ program to implement circular queue. (10 Marks)

Module-3

- 5 a. Write algorithms to implement following operations on singly linked list:
 - i) Insert a node at end of list
 - ii) Insert a node at any specified position. (10 Marks)
- b. Explain linked implementation of stacks with suitable diagrams. Also write algorithms to implement stack push and pop operations using singly linked list. (10 Marks)

OR

- 6 a. Discuss implementation of queue operations using doubly linked lists. Suggest algorithms to implement 'insert' and 'delete' operations of queue using doubly linked list. (10 Marks)
- b. Write algorithms for performing following operations on circular linked lists:
 - i) Search a 'key' element in the circular list.
 - ii) Merge two circular linked lists. (10 Marks)

Module-4

- 7 a. Explain following with an example to each:
i) Binary tree ii) Strictly binary tree iii) Complete binary tree
iv) Skewed tree v) Level of a tree (10 Marks)
- b. Write a C++ program to traverse a given binary tree in preorder, inorder and postorder. (10 Marks)

OR

- 8 a. What is Binary Search Tree (BST)? Construct BST for the following data and traverse the tree in inorder, preorder and postorder
66, 45, 25, 90, 68, 85, 92, 54, 48 (10 Marks)
- b. Write algorithms for : (i) inserting a node in BST (ii) Deleting a node from a BST.
Explain with suitable examples. (10 Marks)

Module-5

- 9 a. Write an algorithm for selection sort. Trace the algorithm for the following set of values.
42, 85, 22, 98, 55, 15 (10 Marks)
- b. Write a C++ program for quick sort. (10 Marks)

OR

- 10 a. Write a C++ program for binary search. (10 Marks)
- b. Briefly explain different hash collision resolution techniques. (10 Marks)
