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15CS33

Third Semester B.E. Degree Examination, July/August 2022
Data Structures and Applications

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Write a C function to arrange numbers in ascending order using bubble sort. (05 Marks)
- b. Write a C function to insert an item into an array at the specified position. Check for invalid positions. (05 Marks)
- c. Write a C function to search for a specific pattern PAT in a given text string T and return its position. IF pattern not found return - 1. (06 Marks)

OR

- 2 a. Write C functions (do not use built-in functions) to perform the following :
i) strlen () ii) strcpy(). (06 Marks)
- b. What is a structure? Mention the differences between structure and union with example. (06 Marks)
- c. Write a function to read two elements using two pointers and print sum of two numbers in suitable form (Ex : 4 + 2 = 6). (04 Marks)

Module-2

- 3 a. Write a recursive function to display array elements in reverse order. (04 Marks)
- b. Write a C function to convert from infix expression to postfix expression. (06 Marks)
- c. Convert the following expressions :
i) Infix to post fix : $((6 + (3 - 2) * 5) / 2 + 3)$
ii) Infix to post fix : $((A + B) * C^D) / E + F$ (06 Marks)

OR

- 4 a. What is a queue? Write C function to insert an item at the rear end and to delete an item from the front end. (08 Marks)
- b. Assume QUE_SIZE is 5. The circular queue contains 4 items 10, 20, 30, 40. Show the contents of circular queue after performing each of the following operations :
i) insert 50 ii) insert 60 iii) delete iv) delete v) insert 70 vi) insert 80. (08 Marks)

Module-3

- 5 a. Write C functions to perform the following operations using linked lists.
i) Reverse a given list without creating new nodes
ii) Concatenate two lists. (10 Marks)
- b. Write a C function to delete a specified node from a singly linked list. (06 Marks)

OR

- 6 a. Write C function to insert an item at the front end of circular list and to delete an item from front end of circular queue. (08 Marks)
- b. What is a header node in linked list? Write C function to insert an item at the rear end of circular doubly linked list with a header nodes and to delete an item from rear end of circular doubly linked list with header node. (08 Marks)

Module-4

- 7 a. Define the terms :
i) Binary tree
ii) Binary search tree. (04 Marks)
- b. Write an iterative function to traverse the tree in inorder. (05 Marks)
- c. Write a C function to insert an item into a binary search tree. Write a binary search tree by inserting the following items : 100, 50, 25, 90, 80, 200, 150, 180, 300. (07 Marks)

OR

- 8 a. Write a C function to create a binary tree for a given postfix expression. Construct a binary tree for postfix expression :
6 3 2 - 5 * + 2 \$ 3 + (10 Marks)
- b. Write C function to :
i) Count number of nodes in a binary search tree
ii) To find maximum element in a binary search tree. (06 Marks)

Module-5

- 9 a. Define the following :
i) Directed graph
ii) Complete graph
iii) Adjacency matrix
iv) Connected graph. (08 Marks)
- b. What are different types of graph traversal techniques? Write a C function for BFS traversal using adjacency matrix. (08 Marks)

OR

- 10 a. Write a C function to arrays numbers in ascending order using insertion sort. (08 Marks)
- b. What is linear probing? Write a C function to insert an item into an empty slot using linear probing. (08 Marks)
