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Second Semester MCA Degree Examination, Dec.2016/Jan.2017
Data Structures Using C

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Define data, data structure and ADT. Explain queue ADT with its applications. (10 Marks)
 b. What is static and dynamic memory allocation? What is the return type of malloc() function. Write a C program to swap two integer variables dynamically. (10 Marks)
- 2 a. Define stack write C routines to implement push and pop function for stack of strings using two dimensional arrays of characters. List the applications of stack. (10 Marks)
 b. Write a C program to convert an infix expression to prefix expression. (10 Marks)
- 3 a. Write an algorithm for evaluating a postfix expression. Trace the algorithm on the following expression and show the contents of stack:
 $3\ 2\ +\ 8\ 3\ -\ * \ 2\ \$$. (10 Marks)
 b. Write a recursive function fact(n) to find the factorial of an integer. Diagrammatically explain how the staking and unstacking takes place during execution for fact(3). (10 Marks)
- 4 a. Define space and time complexity. Bring out the differences between recursive programming over iterative program with example. (10 Marks)
 b. What is the advantage of circular queue over linear queue? Write C routines for inserting and deleting an element at front in the circular queue. (10 Marks)
- 5 a. How can an ordinary queue be represented using a singly linked list? Write a C function for linked implementation of ordinary queue insertion and detection. (10 Marks)
 b. What are the advantages and disadvantages of representing a group of items as an array versus linear linked list? Write a C function to concatenate 2 linear lists. (10 Marks)
- 6 a. Give the node structure to create a linked list of integers and write C functions to perform the following:
 i) Create 3 list nodes with data 10, 20 and 30.
 ii) Insert a node with the data value 15 in between the nodes having values 10 and 20.
 iii) Delete the node which is followed by a node whose data value is 20.
 iv) Display the resulting singly linked list. (10 Marks)
 b. Write a tree for an expression $A/B + C * D + E$. Give the algorithm for in order, post order and pre order traversals and apply that traversal methods to the expression tree and give the result of traversals. (10 Marks)
- 7 a. Define a binary search tree and construct a binary search tree with elements {22, 28, 20, 25, 22, 15, 18, 10, 14}. Give recursive search algorithm to search an element in that tree. (10 Marks)
 b. Write a C module to sort n integers using quick sort. Trace the quick sort for below data 25, 5, 48, 37, 92, 86, 33. (10 Marks)
- 8 Write short notes on:
 a. Hashing b. Heap sort c. AVL tree d. Double linked list. (20 Marks)

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