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13MCA21

Second Semester MCA Degree Examination, June/July 2017
Data Structures using C

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. What do you mean by Abstract Data Type (ADT)? Describe rational numbers as ADT which supports addition and multiplication operations. (10 Marks)
b. Write C functions to implement following operations:
 - i) Finding length of a string. (10 Marks)
 - ii) Concatenation of two strings. (10 Marks)
- 2 a. Define stack. Write C functions to implement push and pop operations on stack. (08 Marks)
b. Convert the following infix expression into prefix and postfix notations:
 $A + B * C + D - E / F$. (04 Marks)
c. Write a C program to evaluate a valid postfix expression. (08 Marks)
- 3 a. Define a recursive function. What are the conditions imposed on a recursive function? (06 Marks)
b. Write a recursive C function to find factorial of a number. (04 Marks)
c. Explain Tower of Hanoi problem. Write a program to implement the same. (10 Marks)
- 4 a. Write a C program to implement primitive operations on queue. (10 Marks)
b. Discuss the concept of priority queue. (05 Marks)
c. What is the need for linked list data structure? Explain. (05 Marks)
- 5 a. What is the need for circular linked list? Explain with suitable example. (05 Marks)
b. Write a C function to delete a particular node from a single linked list. (10 Marks)
c. Briefly discuss the concept of non-homogenous linked lists. (05 Marks)
- 6 a. Write a C program to implement quick sort on an array of integers. (10 Marks)
b. Briefly explain the concept of merge sort. Implement merge sort on following list of elements: E, X, a, M, p, L, E. (10 Marks)
- 7 a. Explain binary search technique. Write a C function to implement the same. (10 Marks)
b. Implement the hash function $H(k) = k \% 10$ on the numbers: 10, 34, 23, 56, 14, 89, 65, 94, 53, 21, 63, 33. Show the hash table. Resolve hash clashes, if any, by using different methods. (10 Marks)
- 8 a. Define the following terms with suitable example for each:
 - i) Binary search tree (08 Marks)
 - ii) AVL tree (06 Marks)
 - iii) Strictly binary tree (06 Marks)
 - iv) Complete binary tree. (06 Marks)
b. Write algorithms for different tree traversal methods. (06 Marks)
c. Construct AVL tree for the following elements: 3, 5, 11, 8, -4, 1, 12, 7. (06 Marks)

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Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or questions written Qs 12-6-20, will be treated as malpractices.