Reg. No. ☐☐☐☐☐☐☐☐☐☐

MANIPAL UNIVERSITY

THIRD SEMESTER B.S. (ENGG.) DEGREE EXAMINATION – DECEMBER 2013

SUBJECT: DATA STRUCTURES (CS 231)
(NEW SCHEME)

Friday, December 13, 2013

Time: 10:00 – 13:00 Hrs.   Max. Marks: 100

✍ Answer any FIVE full questions.
✍ All functions and programs should be well documented

1A.   Write a C++ recursive program to solve the Tower of Hanoi problem. Discuss its time complexity.

(6+4 = 10 marks)

1B.   Describe class Templates and function templates.

(2+2 = 4 marks)

1C.   Explain time complexity in algorithm analysis with an example.

(6 marks)

2A.   Illustrate the application of stacks in converting the infix expression
(A/B)×C+D/(E×H)-J to its postfix form.

2B.   Write an algorithm to evaluate postfix expression using stack.

2C.   Write CPP functions to check if stack is empty or full with necessary class definition.

(8+4+8 = 20 marks)

3A.   Discuss the advantage of circular queue over ordinary queue.

3B.   A circular queue has a size of 5 and has 3 elements 11, 22 and 33, where front, F=2 and rear, R=4. After inserting 44 and 55, what is value of F and R. Trying to insert 66 at this stage what will happen? Delete 2 elements from the queue and insert 77. Show the sequences of steps with necessary diagrams with the value of F and R.

3C.   Write notes on:
   i)   Priority queue   ii)   Double ended queue

(4+10+(3+3) = 20 marks)

4A.   Differentiate between doubly linked list and singly linked list.

4B.   Give an algorithm to search for an element in a doubly linked list   .

4C.   Implement a linked queue with all necessary functions using C++.

(2+8+10 = 20 marks)

5A.   Write a recursive function to create a binary search tree.

5B.   Write an algorithm to delete nodes in a binary search tree by considering all necessary conditions.

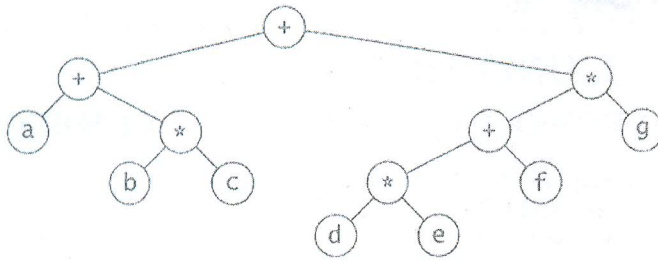5C.   Obtain the tree traversals for the expression tree shown in Fig Q.5.C.

Fig Q.5.C

(5+6+(3×3) = 20 marks)

6A. What are the problems in hashing? Explain techniques to overcome the problems in hashing.

6B. Differentiate between static hashing and dynamic hashing.

6C. Discuss the time complexity of linear search and binary search algorithms.

(8+6+6 = 20 marks)

7A. Define the following:

    i)   Directed graph   ii)   Weighted graph

(2×2 = 4 marks)

7B. Write a CPP program to sort an array using merge sort method. Compare its average time complexity with bubble sort method.

(5+5 = 10 marks)

7C. Write an algorithm to perform

    i)   Depth First Search   ii)   Breadth First Search

(3×2 = 6 marks)

8A. Give the recursive function for inorder traversal of a binary tree.

8B. Given the following list of elements, construct a min heap showing intermediate steps.
{ 60,32,56, 6,7,9,12,89,5,23,64,67 }

8C. Write short notes on the following:

    i)   Adjacency Matrix   ii)   Adjacency List

(4+8+8 = 20 marks)